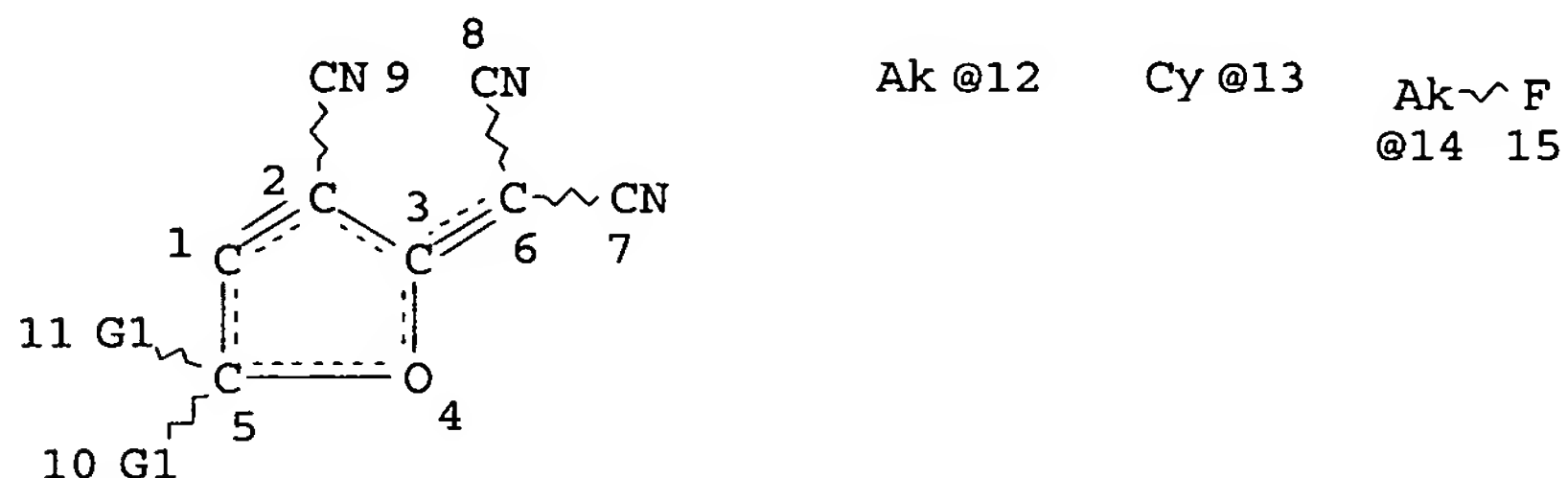


L7 ANSWER 1 OF 1 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:321594 HCAPLUS  
 DOCUMENT NUMBER: 141:39718  
 TITLE: Experimental and Theoretical Investigations of  
 Environmentally Sensitive Single-Molecule Fluorophores  
 AUTHOR(S): Willets, Katherine A.; Callis, Patrik R.; Moerner, W.  
 E.  
 CORPORATE SOURCE: Department of Chemistry, Stanford University,  
 Stanford, CA, 94305, USA  
 SOURCE: Journal of Physical Chemistry B (2004), 108(29),  
 10465-10473  
 CODEN: JPCBFK; ISSN: 1520-6106  
 PUBLISHER: American Chemical Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 REFERENCE COUNT: 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS  
 RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

=> d que 18

L3 STR



VAR G1=12/13/14  
 NODE ATTRIBUTES:  
 CONNECT IS E1 RC AT 12  
 DEFAULT MLEVEL IS ATOM  
 GGCAT IS UNS AT 13  
 DEFAULT ECLEVEL IS LIMITED

GRAPH ATTRIBUTES:  
 RING(S) ARE ISOLATED OR EMBEDDED  
 NUMBER OF NODES IS 15

STEREO ATTRIBUTES: NONE

L5 277 SEA FILE=REGISTRY SSS FUL L3  
 L6 118 SEA FILE=HCAPLUS ABB=ON PLU=ON L5  
 L7 1 SEA FILE=HCAPLUS ABB=ON PLU=ON L6 AND (BIOMOL? OR NA OR  
 NUCLEIC ACID OR ?SACCHAR? OR ?NUCLEOT? OR ?LIPID?)  
 L8 118 SEA FILE=HCAPLUS ABB=ON PLU=ON L6 OR L7

=> d 18 ibib abs hitstr 1-118

L8 ANSWER 1 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:864600 HCAPLUS  
 DOCUMENT NUMBER: 142:13023  
 TITLE: One-, two-, and three-photon absorption induced  
 fluorescence of a novel chromophore in chloroform

AUTHOR(S): solution  
Wang, Yuxiao; Tai, Oliver Y.-H.; Wang, C. H.; Jen, Alex K.-Y.  
CORPORATE SOURCE: Center of Organic Materials for Advanced Technology  
and Department of Physics, National Sun Yat-sen  
University, Kaohsiung, Taichung, 80424, Taiwan  
SOURCE: Journal of Chemical Physics (2004), 121(16), 7901-7907  
CODEN: JCPSA6; ISSN: 0021-9606  
PUBLISHER: American Institute of Physics  
DOCUMENT TYPE: Journal  
LANGUAGE: English

AB One-, two-, and three-photon absorption induced fluorescence intensities of a novel nonlinear optical chromophore have been measured by using a tunable femtosecond pulsed laser as the excitation. Four resonance peaks are observed as the excitation wavelength is tuned from 600 to 2000 nm. These peaks correspond to the one-, two- and three-photon fluorescence resonance. Except for intensity difference, the lifetime and the fluorescence spectrum are found to be the same for the one-, two-, or three-photon resonance, hence suggesting that the same excited energy level is involved in emitting the fluorescence intensity. A three-level model is developed to account for the incident excitation laser intensity dependence of the one-photon and multiphoton fluorescence intensity. The model allows the multiphoton absorption cross sections to be extracted; it can also account for the deviation observed in the linear, square, and cubic intensity dependence of the one-, two-, and three-photon fluorescence intensity, resp. To determine the absorption cross sections, the present method does not require the fluorescence quantum efficiency data needed in the low intensity technique.

IT 613237-44-8

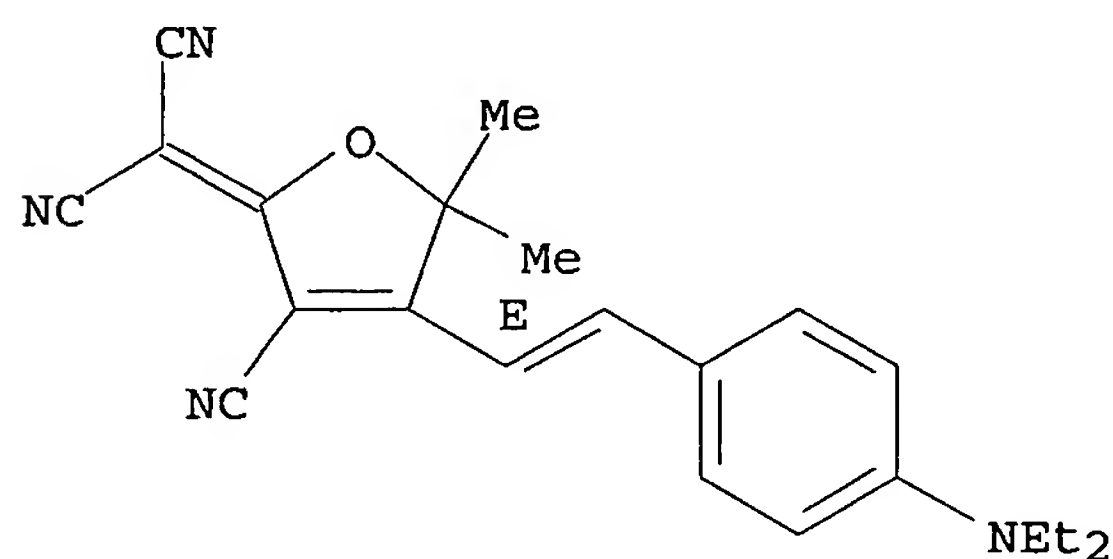
RL: PRP (Properties)

(one-, two-, and three-photon absorption induced fluorescence of nonlinear optical chromophore in chloroform solution)

RN 613237-44-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 2 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:802620 HCAPLUS

DOCUMENT NUMBER: 141:304008

TITLE: Fluorinated pi-bridge second order nonlinear optical chromophores and electro-optic devices therefrom

INVENTOR(S): Huang, Diyun

PATENT ASSIGNEE(S): USA  
 SOURCE: U.S. Pat. Appl. Publ., 20 pp., Cont.-in-part of U.S.  
 Ser. No. 301,978.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 5  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004192942	A1	20040930	US 2004-757375	20040114
US 2002160282	A1	20021031	US 2001-932831	20010817
US 6716995	B2	20040406		
US 2003107027	A1	20030612	US 2002-301978	20021122
US 6750603	B2	20040615		

PRIORITY APPLN. INFO.:  
 US 2000-226267P P 20000817  
 US 2001-932831 A2 20010817  
 US 2002-301978 A2 20021122

OTHER SOURCE(S): MARPAT 141:304008

AB Nonlinear optical chromophores are described by the general formula D- $\pi$ -A ( $\pi$  = a  $\pi$  bridge including a thiophene ring having oxygen atoms bonded directly to the 3 and 4 positions of the thiophene ring; D = a donor; A = an acceptor; and the oxygen atoms are further substituted with a fluorinated group comprising  $\geq 3$  fluorines). Second order nonlinear optical compns. comprising a polymer matrix and the chromophores are also described. Electrooptical devices (e.g., optical modulators, optical switches, and optical directional couplers) and (e.g., optically-assisted) phased array radar systems are described which employ the compns.

IT 540777-74-0P 540777-78-4P

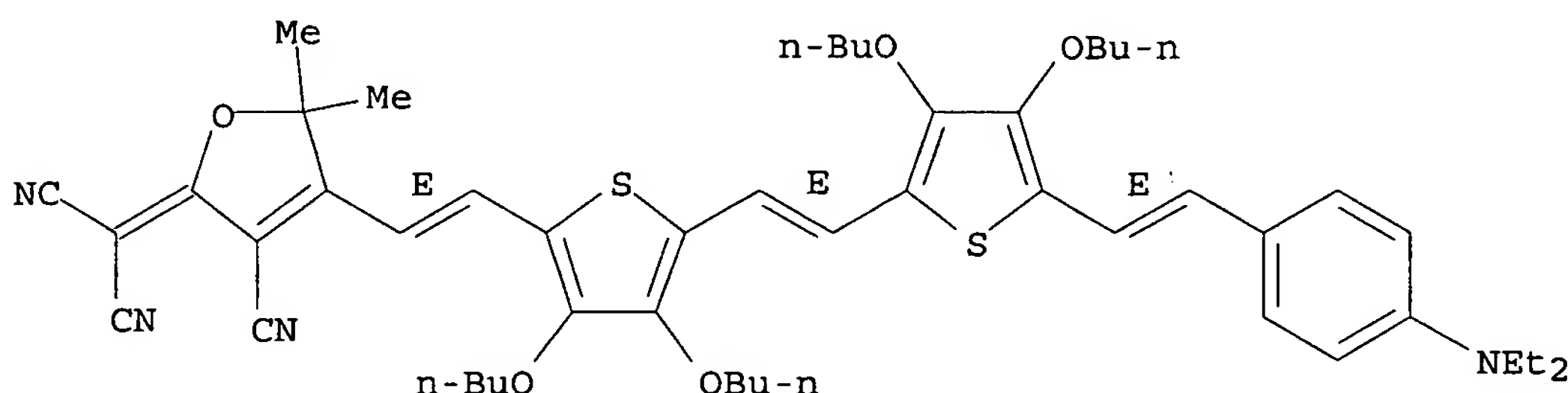
RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(fluorinated pi-bridge nonlinear optical chromophores and compns. and electrooptical devices using them)

RN 540777-74-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

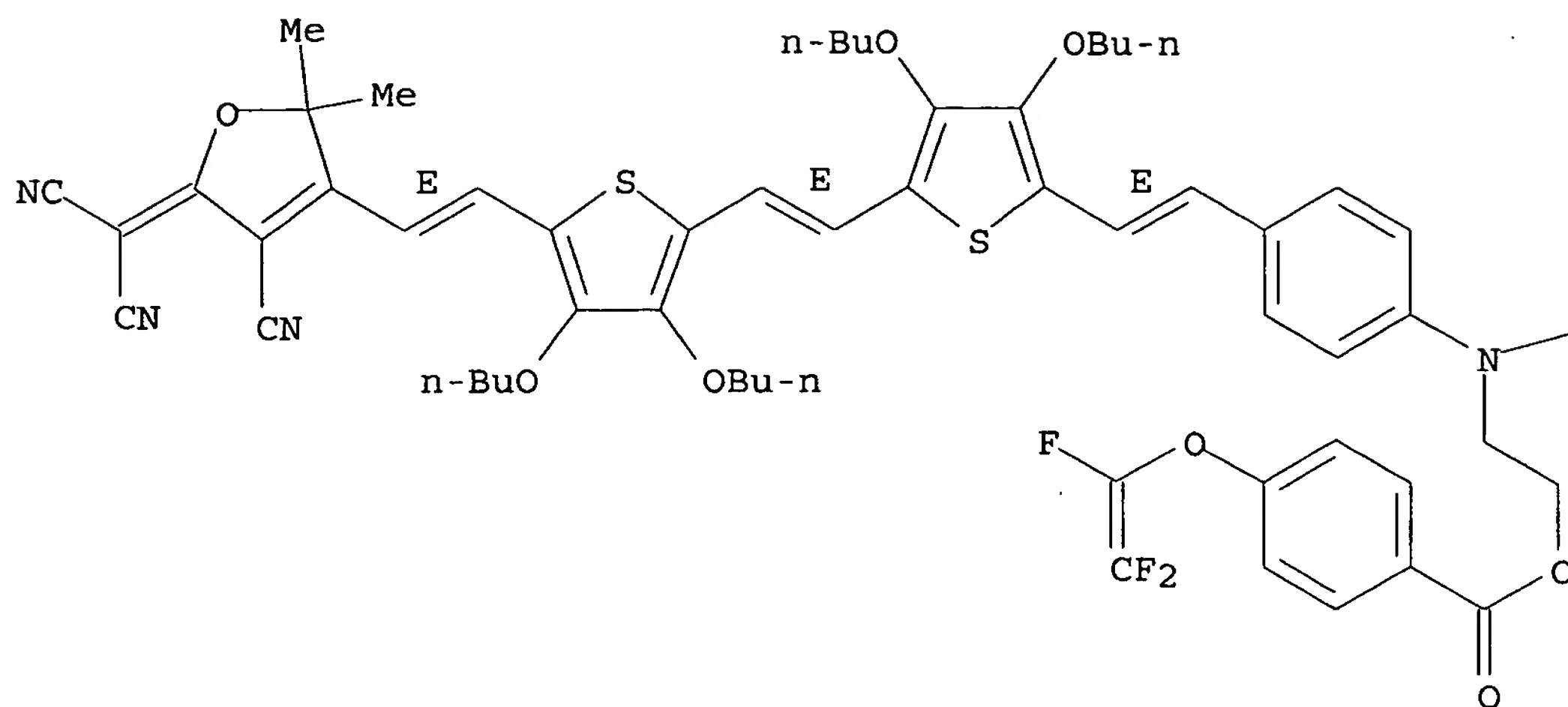


RN 540777-78-4 HCAPLUS

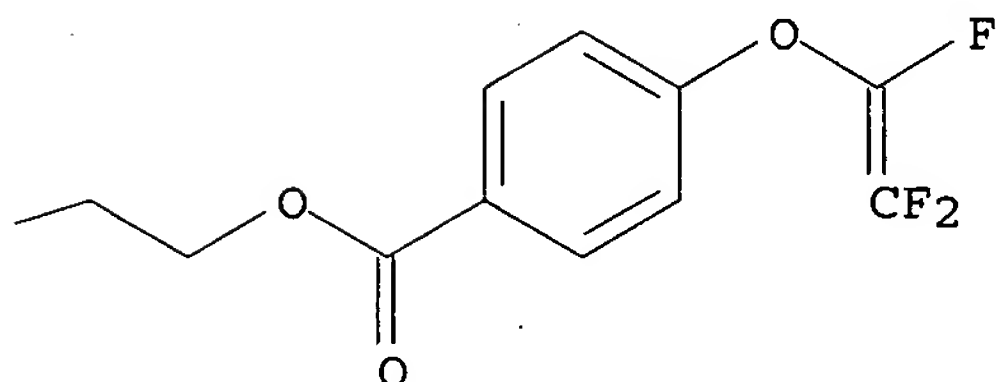
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

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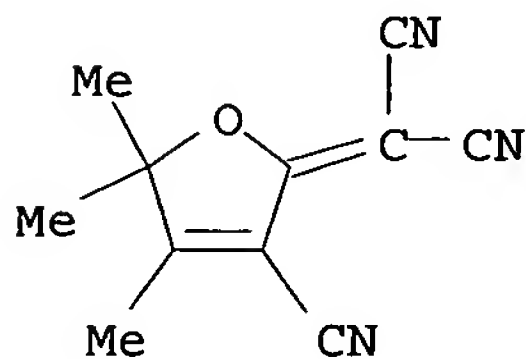
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(fluorinated pi-bridge nonlinear optical chromophores and compns. and electrooptical devices using them)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanlydene) - (9CI) (CA INDEX NAME)



IT 540777-76-2P 540777-77-3P



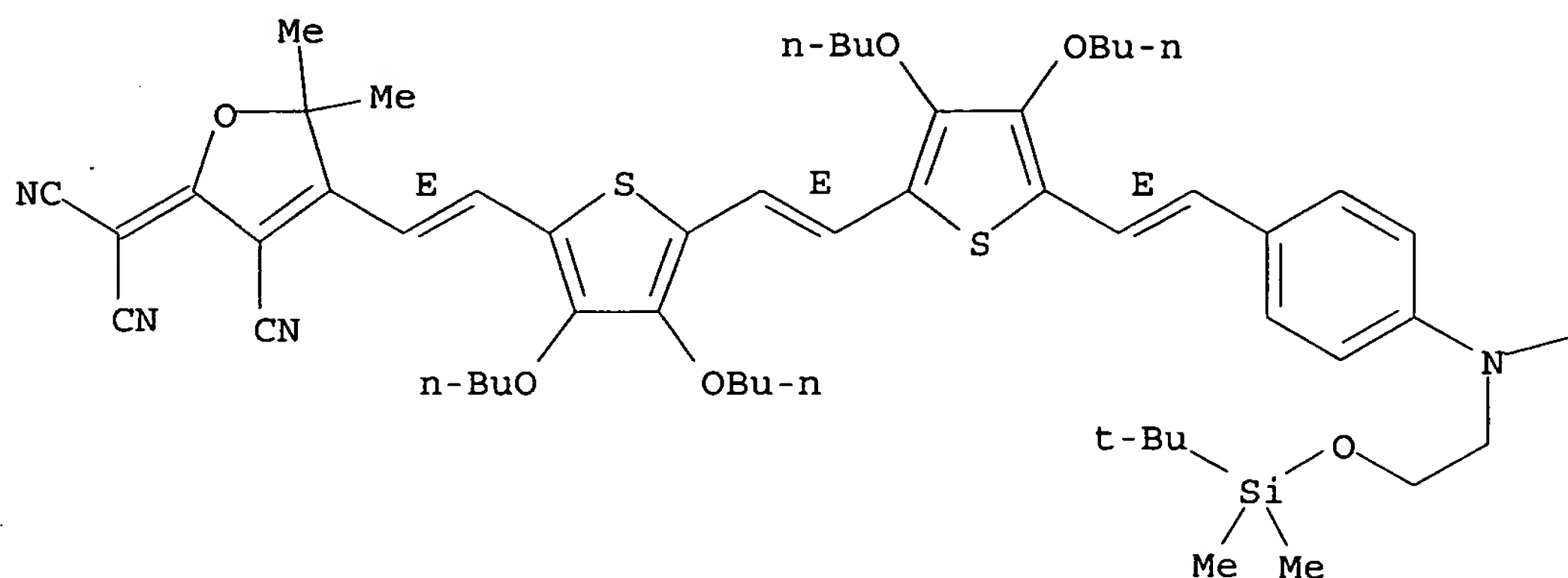
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(fluorinated pi-bridge nonlinear optical chromophores and compns. and electrooptical devices using them)

RN 540777-76-2 HCAPLUS

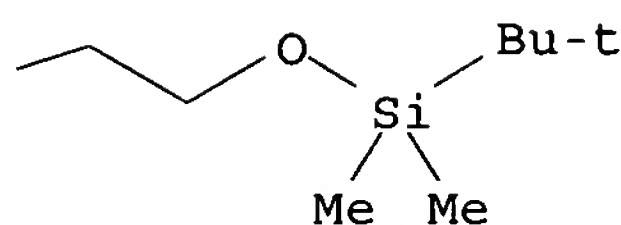
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

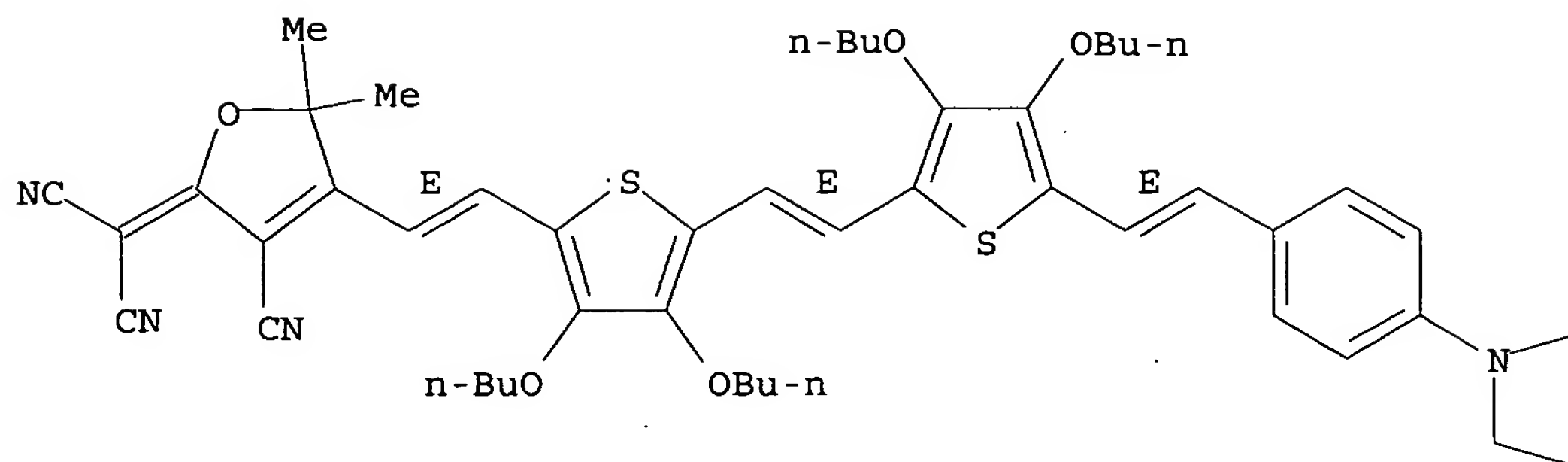


RN 540777-77-3 HCAPLUS

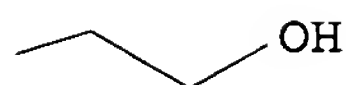
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

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PAGE 1-B



IT 765317-91-7P

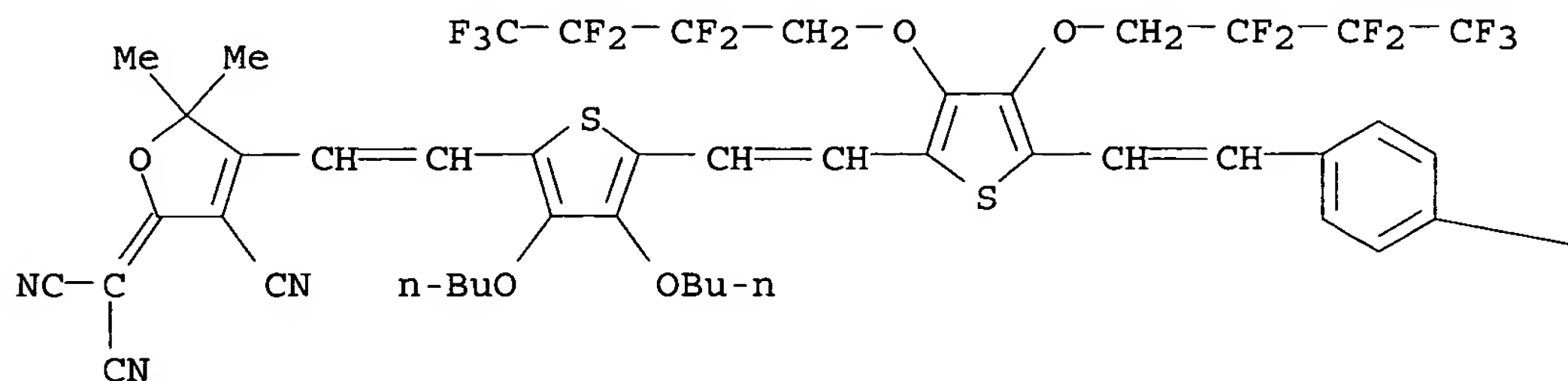
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(fluorinated pi-bridge nonlinear optical chromophores and compns. and electrooptical devices using them)

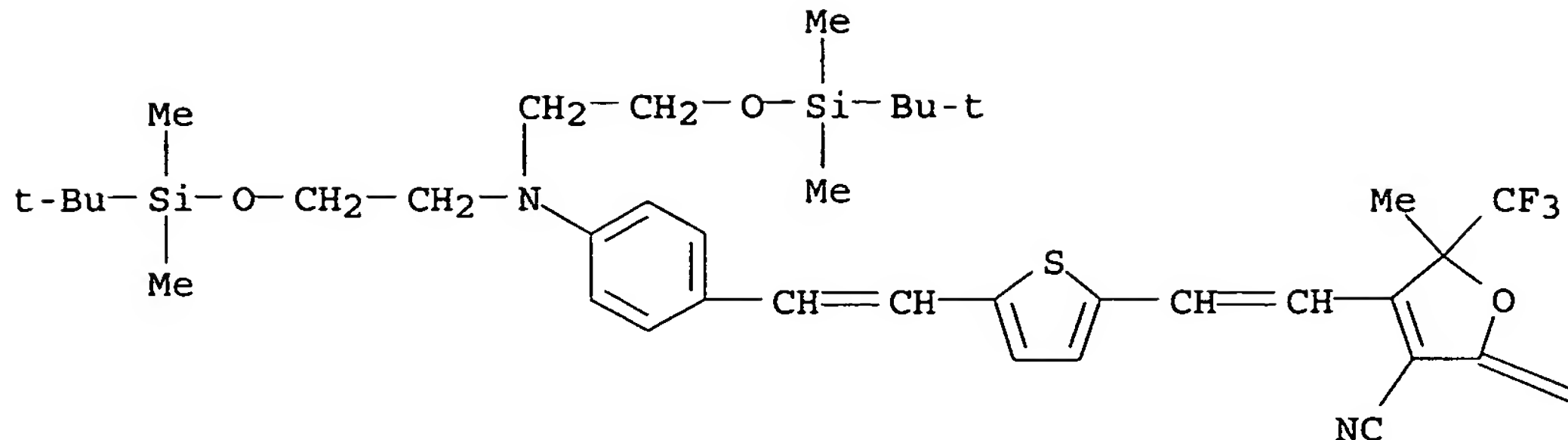
RN 765317-91-7 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-bis(2,2,3,3,4,4,4-heptafluorobutoxy)-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene] - (9CI) (CA INDEX NAME)

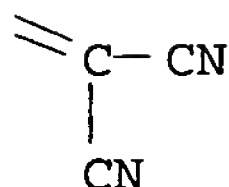
PAGE 1-A



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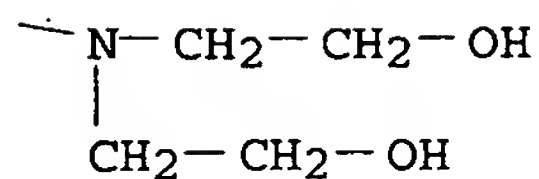
PAGE 1-B



REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 4 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:742110 HCAPLUS  
 DOCUMENT NUMBER: 141:395358  
 TITLE: Synthesis of an Isophorone-Based Nonlinear Optical Chromophore  
 AUTHOR(S): Davis, Matthew C.; Chafin, Andrew P.; Hollins, Richard A.; Baldwin, Lawrence C.; Erickson, Eric D.; Zarras, Peter; Drury, Elliott C.  
 CORPORATE SOURCE: Chemistry & Materials Division, Research Department, Naval Air Warfare Center Weapons Division, China Lake, CA, 93555, USA  
 SOURCE: Synthetic Communications (2004), 34(18), 3419-3429  
 CODEN: SYNCAV; ISSN: 0039-7911  
 PUBLISHER: Marcel Dekker, Inc.  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB The synthesis of a "CLD-type" nonlinear optical chromophore incorporating the isophorone unit to rigidize the polyene segment is described. The synthesis required seven steps with an overall yield of 17%.  
 IT 790240-40-3P  
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (synthesis of isophorone-based nonlinear optical chromophore)  
 RN 790240-40-3 HCAPLUS

PAGE 1-B



L8 ANSWER 3 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:767948 HCAPLUS

DOCUMENT NUMBER: 141:429311

TITLE: Replica-molded electro-optic polymer Mach-Zehnder modulator

AUTHOR(S): Paloczi, George T.; Huang, Yanyi; Yariv, Amnon; Luo, Jingdong; Jen, Alex K.-Y.

CORPORATE SOURCE: Department of Applied Physics, California Institute of Technology, Pasadena, CA, 91125, USA

SOURCE: Applied Physics Letters (2004), 85(10), 1662-1664  
CODEN: APPLAB; ISSN: 0003-6951

PUBLISHER: American Institute of Physics

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A Mach-Zehnder electrooptic polymer amplitude modulator is fabricated by a simple and high-throughput soft-stamp replica-molding technique. The modulator structure incorporates the highly nonlinear and stable chromophore, AJL8, doped in amorphous polycarbonate. Single-arm phase-retardation results in a halfwave voltage ( $V\pi$ ) of 8.4 V at 1600 nm. The on/off extinction ratio is better than 19 dB, resulting from precise Y-branch power splitters and good waveguide uniformity. The simple fabrication process allows for good optical performance from high-fidelity replicas of the original master devices.

IT 794527-93-8

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

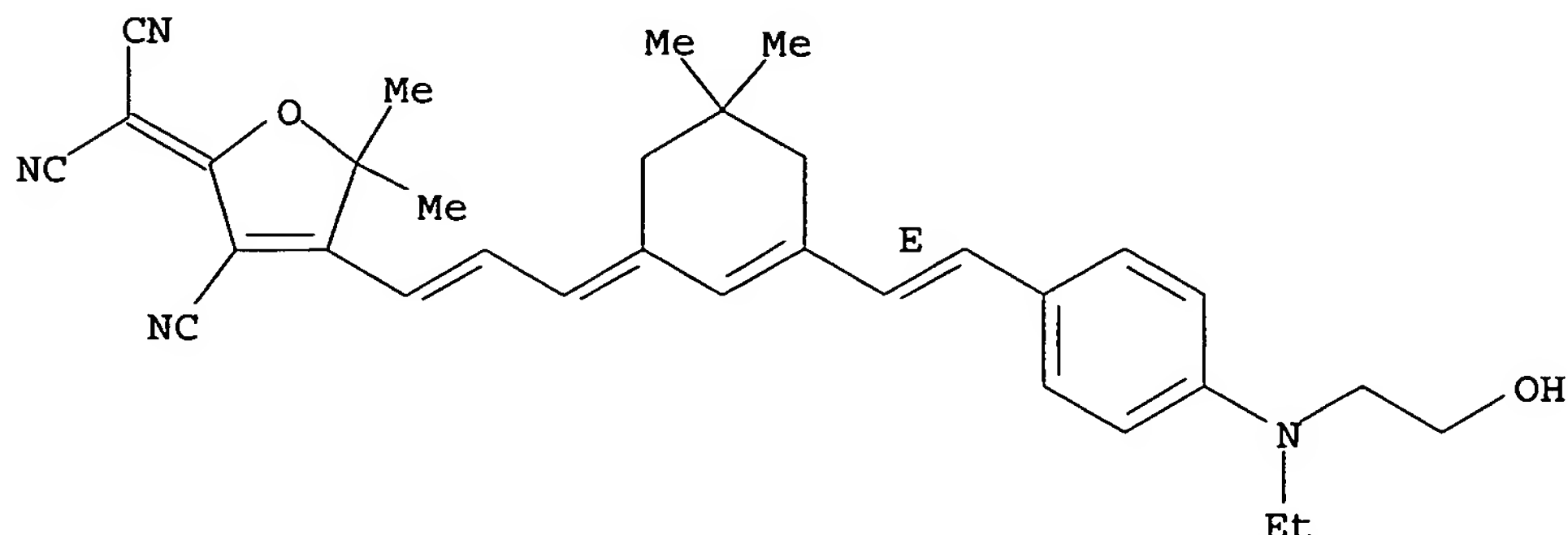
(polycarbonate containing AJL8; replica-molded electrooptic polymer Mach-Zehnder modulator)

RN 794527-93-8 HCAPLUS

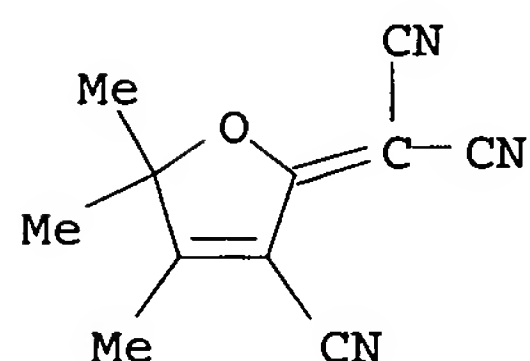
CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-[[[1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-thienyl]ethenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

CN Propanedinitrile, [3-cyano-4-[3-[3-[(1E)-2-[4-[ethyl(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as described by E or Z.



IT 171082-32-9P, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran  
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (synthesis of isophorone-based nonlinear optical chromophore)  
 RN 171082-32-9 HCAPLUS  
 CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 5 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:670561 HCAPLUS  
 DOCUMENT NUMBER: 141:424454  
 TITLE: Nanoscale molecular control for nonlinear optical applications  
 AUTHOR(S): Kim, Dong Wook; Park, Eung Jae; Lee, Kwang-Sup; Yoon, Eun Young; Kim, Kyoung Man; Jin, Moon Young; Lee, Changjin  
 CORPORATE SOURCE: Advanced Materials Division, Korea Research Institute of Chemical Technology, Daejeon, 305-600, S. Korea  
 SOURCE: Polymeric Materials: Science and Engineering (2004), 91, 1005  
 CODEN: PMSEDG; ISSN: 0743-0515  
 PUBLISHER: American Chemical Society  
 DOCUMENT TYPE: Journal; (computer optical disk)  
 LANGUAGE: English  
 AB Structure modeling and exptl. results suggest that intermol. electrostatic

interactions between NLO [nonlinear optical] chromophores with high dipole moment hinder efficient aligning of the chromophores. Preventing the antiparallel interactions of chromophores at the mol. level is highly desirable to achieve efficient poling and high macroscopic NLO activity. Introducing a bulky side chain into the mols. allowed to achieve chromophore separation. Another effective method is incorporation of NLO chromophores into a dendritic structure. The dendritic architecture was effective for site isolation of chromophores, hence reducing the antiparallel packing of the chromophores. NLO dendrimers were prepared by incorporating polyene-based or azobenzene chromophores into the dendritic structure. The synthesis of the chromophores and dendrimers and their NLO properties are outlined.

IT 795274-09-8P

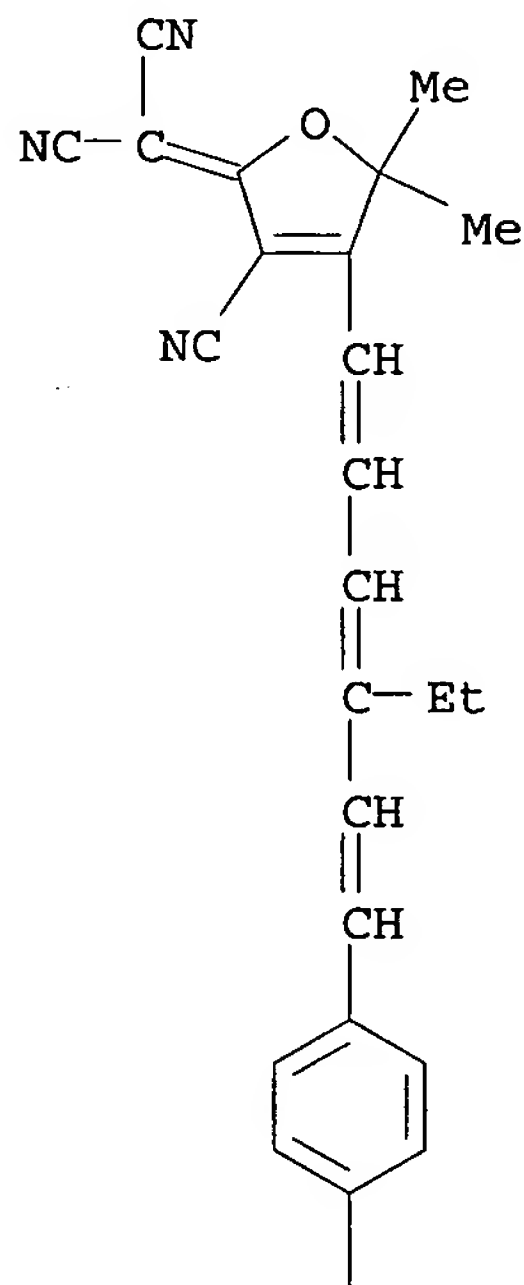
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(NLO chromophore; preparation of cyano-polyene NLO chromophore and dendrimer with nanoscale control of structure for NLO applications)

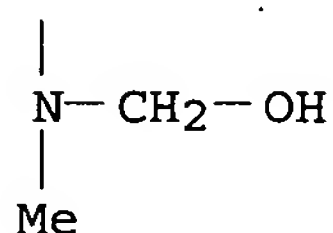
RN 795274-09-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-ethyl-6-[4-[(hydroxymethyl)methylamino]phenyl]-1,3,5-hexatrienyl]-5,5-dimethyl-2(5H)-furanlydene] - (9CI) (CA INDEX NAME)

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IT 795274-08-7P

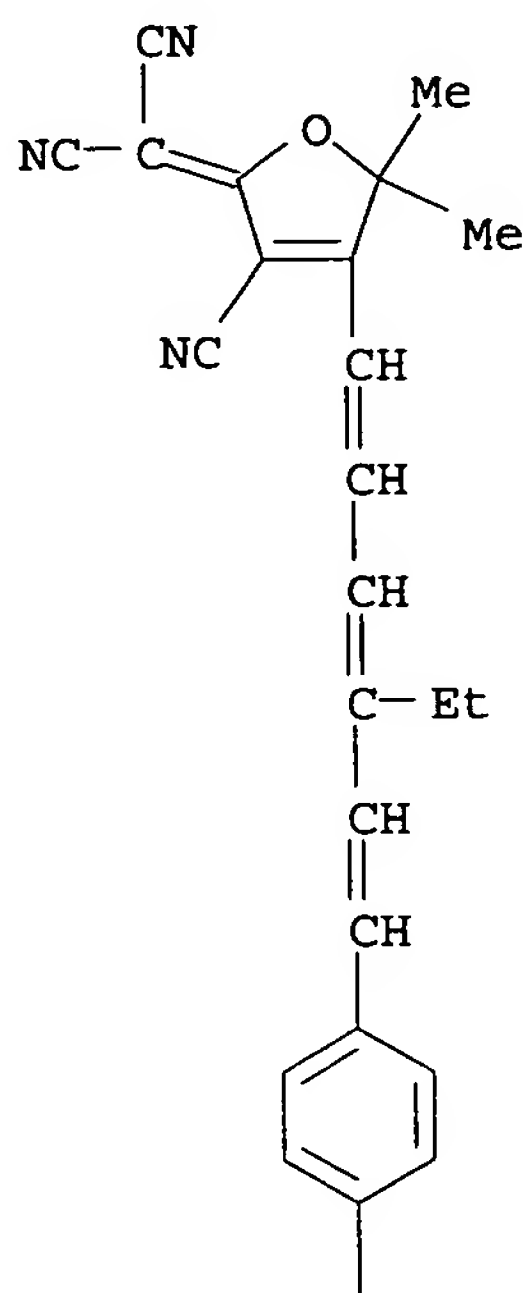
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(intermediate; preparation of cyano-polyene NLO chromophore and dendrimer with nanoscale control of structure for NLO applications)

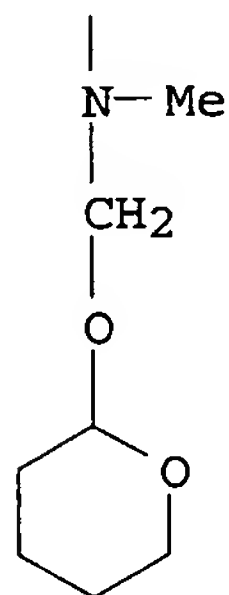
RN 795274-08-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-ethyl-6-[4-[methyl[(tetrahydro-2H-pyran-2-yl)oxy]methyl]amino]phenyl]-1,3,5-hexatrienyl]-5,5-dimethyl-2(5H)-furanlidene]- (9CI) (CA INDEX NAME)

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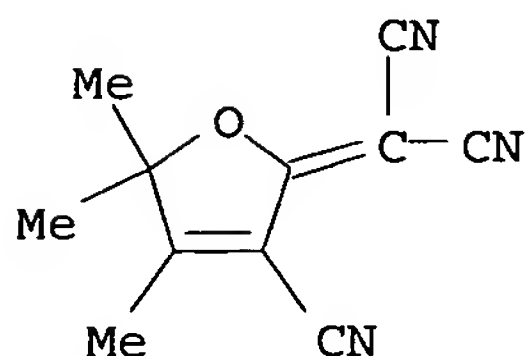
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of cyano-polyene NLO chromophore and dendrimer with nanoscale control of structure for NLO applications)



RN 171082-32-9 HCAPLUS  
 CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 6 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:670196 HCAPLUS

DOCUMENT NUMBER: 141:429306

TITLE: Electro-optic characterization of NLO polymers in a slab waveguide using the ATR technique

AUTHOR(S): Bhatambreakar, Nishant; Chen, Antao; Dalton, Larry; Jen, Alex

CORPORATE SOURCE: Department of Chemistry, University of Washington, Seattle, WA, 98195-1700, USA

SOURCE: Polymeric Materials: Science and Engineering (2004), 91, 687-688

CODEN: PMSEDG; ISSN: 0743-0515

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal; (computer optical disk)

LANGUAGE: English

AB An attenuated total reflection (ATR) spectroscopy technique was used in characterization of electro-optic (EO) materials. The method can independently measure the electro-optic coefficient  $r_{13}$  and  $r_{33}$ , at telecommunication wavelengths, of second order nonlinear optical (NLO) thin films spin coated on ITO glass slides. This technique is applicable to EO thin films poled either by contact poling or by corona poling. The contact poled EO dispersed in a polymer can be characterized without addnl. treatments. In addition to the EO coefficient, the first order piezoelec.

coefficient was also determined The technique is demonstrated on NLO chromophores,

EZ-FTC, neat and dispersed in a polycarbonate.

IT 729612-75-3

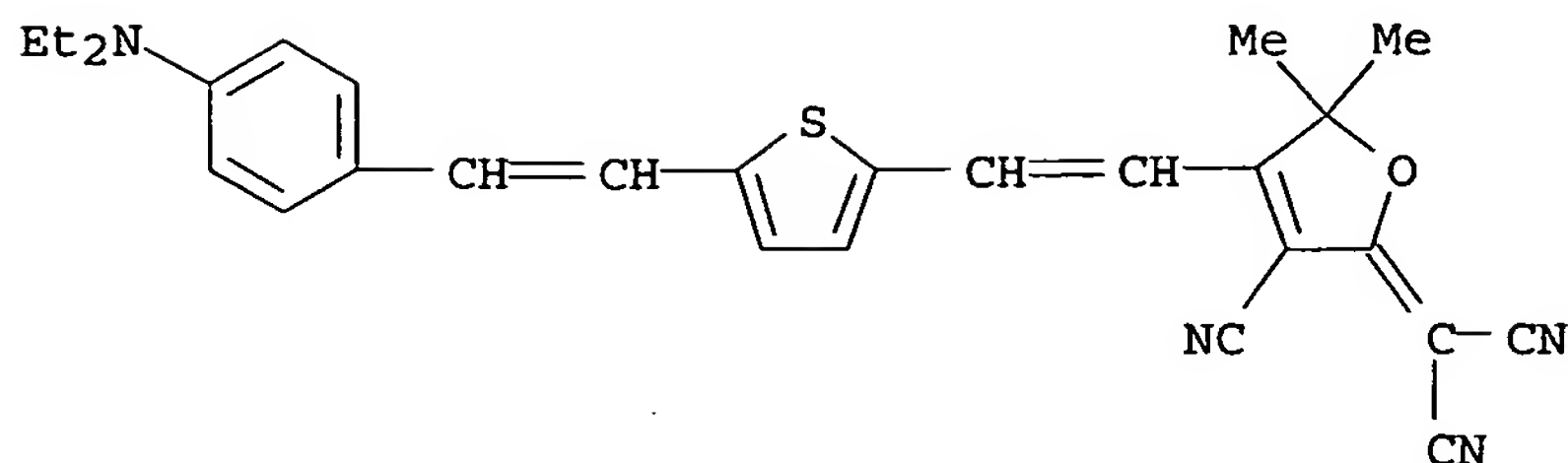
RL: DEV (Device component use); PRP (Properties); USES (Uses)

(EZ-FTC, NLO chromophore; electro-optic coeffs. of NLO chromophores

dispersed in polycarbonate in slab waveguide using the ATR technique)

RN 729612-75-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 7 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:670091 HCAPLUS

DOCUMENT NUMBER: 142:23734

TITLE: Solvatochromism effects on near-IR optical loss in NLO chromophore-polymer guest-host materials

AUTHOR(S): Barto, Richard R., Jr.; Frank, Curtis W.; Bedworth, Peter V.; Ermer, Susan; Taylor, Rebecca E.

CORPORATE SOURCE: Stanford University, Stanford, CA, USA

SOURCE: Polymeric Materials: Science and Engineering (2004), 91, 276-277

CODEN: PMSE DG; ISSN: 0743-0515

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal; (computer optical disk)

LANGUAGE: English

AB Active waveguide technologies for broadband applications related to fiber network, airborne, and space-based communications developed around nonlinear optical (NLO) dye/polymer-based electro-optic devices have distinct advantages over existing RF communications in terms of cost, weight, size, bandwidth, and immunity to electromagnetic interference. However, a lack of understanding of the underlying mechanisms of near-IR optical loss has inhibited demonstration of polymer-based optical devices possessing the requisite combination of high nonlinear activity, high thermal-temporal stability, and low propagation loss needed for wide implementation. The effects of the main dye electronic absorption peak and dye concentration on fundamental near-IR optical absorption were studied in terms of effects of structural variations of systems of bisphenol A polycarbonates and high  $\beta$  NLO dye LMCO-4E6m guest-host materials. Solvatochromism plays an important role in the near-IR absorption loss of LMCO-4E6m. Near-IR loss vs. dye absorption spectral shifts can be understood in terms of dye-polymer interaction energies within the context of the theory of Marcus of polar contributions to initial and final electronic state free energies. The peak shift is described by the solvent polarity function of the polymer host, consistent with the Onsager continuum dielec. model. The loss vs. concentration results show that selection

of a low-loss host polymer is a necessary but insufficient condition for establishing acceptable loss in a NLO dye-polymer system.

IT 676256-53-4, LMCO 4E6m

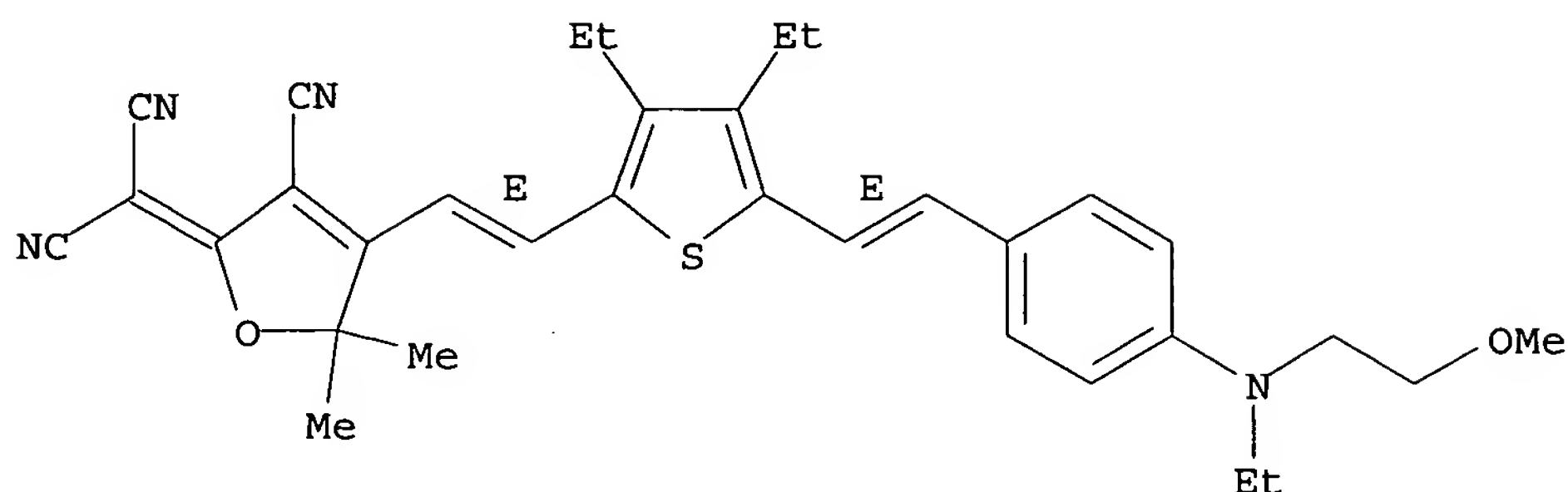
RL: PRP (Properties)

(high  $\beta$  NLO chromophore; solvatochromism effects on near-IR optical loss in high  $\beta$  NLO dye chromophore-polycarbonate guest-host materials)

RN 676256-53-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-diethyl-5-[(1E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 8 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:670088 HCAPLUS

DOCUMENT NUMBER: 142:13267

TITLE: Highly stable NLO chromophore with large electro-optical coefficient

AUTHOR(S): Huang, Diyun; Condon, Stephen; Guan, Hann Wen; Cong, Shuxin; Wolf, Nick; Tolstedt, Don; Johnson, Eric; Nishimoto, Akiko; Dinu, Raluca; Londergan, Tim; Jin, Dan; Parker, Timothy

CORPORATE SOURCE: Lumera Corporation, Bothel, WA, 98011, USA

SOURCE: Polymeric Materials: Science and Engineering (2004), 91, 271

CODEN: PMSDGD; ISSN: 0743-0515

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal; (computer optical disk)

LANGUAGE: English

AB A NLO [nonlinear optical] chromophore, DH-6, having 4-(N,N-diethylamino)benzyltriphenylphosphonium bromide as donor block, 5,5'-(2-hydrocarbonyl-3,4-dibutoxythienyl)ethylene as bridge block, and 2-dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran (TCF) as acceptor block was synthesized and characterized. The electro-optical (EO) response was studied in a host-guest system with amorphous polycarbonate (APC) as host. Extremely high mol. nonlinearity and exceptional thermal and photochem. stability were observed in this chromophore. The chromophore is of great interest for use in high speed EO modulator.

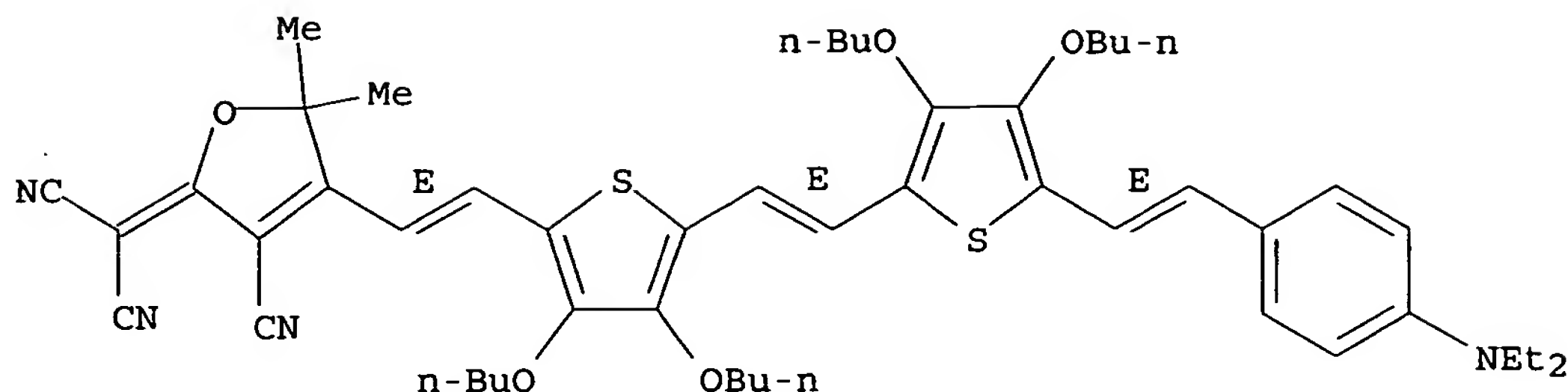
IT 540777-74-0P

RL: PNU (Preparation, unclassified); PRP (Properties); PREP (Preparation) (DH-6 chromophore; electrooptical response of prepared NLO dithienylethylene-bridged chromophore with high thermal and photochem. stability)

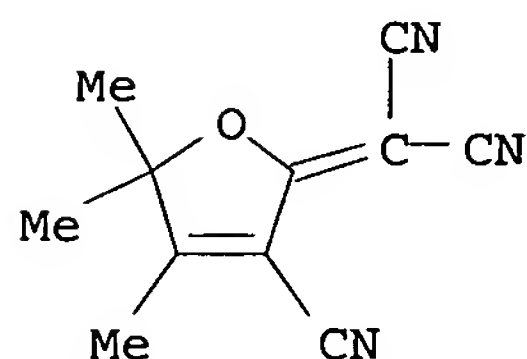
RN 540777-74-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 171082-32-9, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (electrooptical response of prepared NLO dithienylethylene-bridged chromophore with high thermal and photochem. stability)  
 RN 171082-32-9 HCAPLUS  
 CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 9 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:633926 HCAPLUS  
 DOCUMENT NUMBER: 141:174069  
 TITLE: Preparation of 2,5-dihydrofuran-linked thiophene derivatives having conjugated double bonds as nonlinear optical compounds and methods for their preparation  
 INVENTOR(S): Jen, Kwan-yue; Ma, Hong; Liu, Sen; Dalton, Larry R.  
 PATENT ASSIGNEE(S): University of Washington, USA  
 SOURCE: PCT Int. Appl., 69 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004065384	A1	20040805	WO 2003-US1393	20030115
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY,				

KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,  
 FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, SE, SI, SK, TR, BF,  
 BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.:

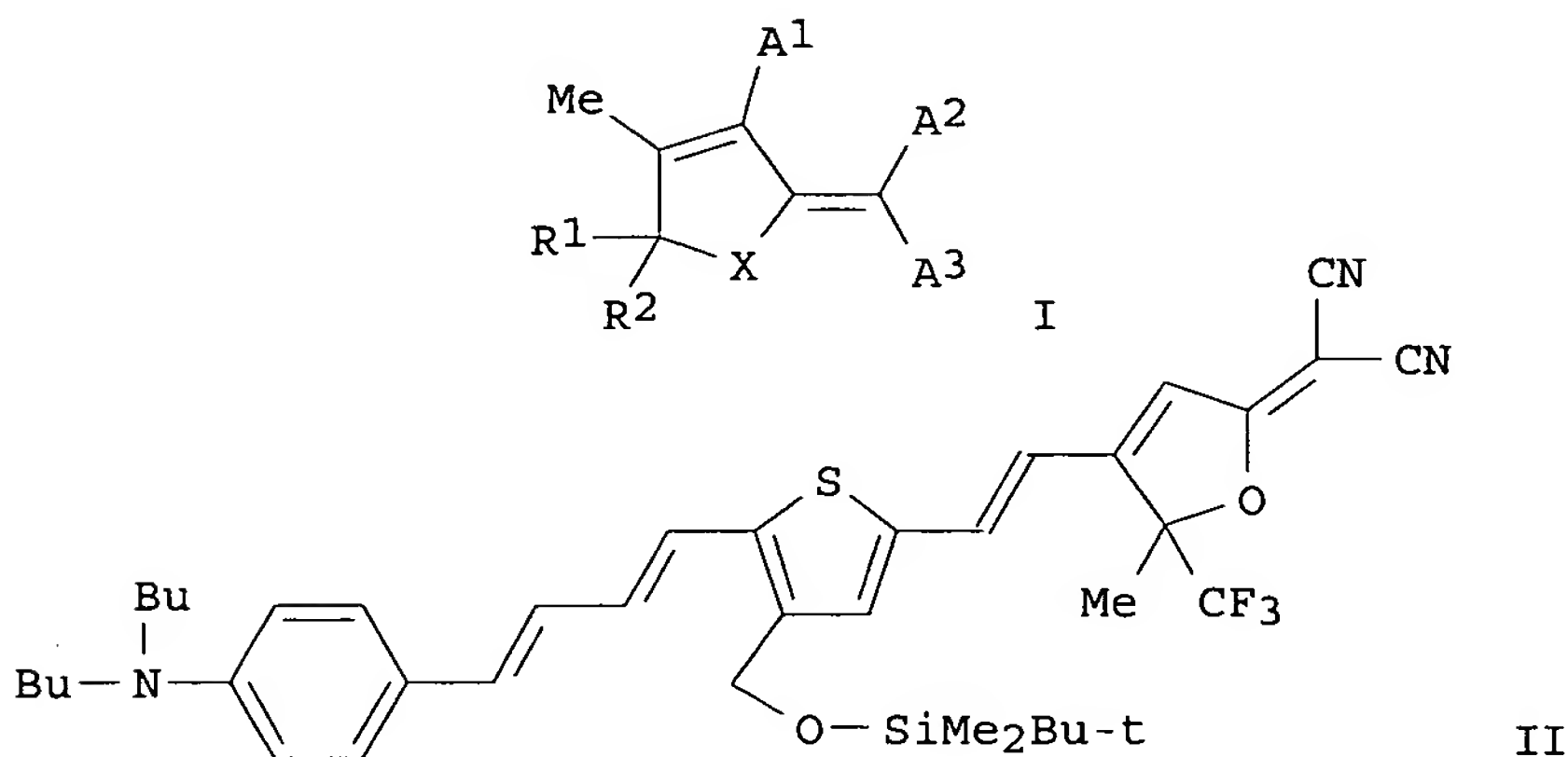
WO 2003-US1393

20030115

OTHER SOURCE(S):

MARPAT 141:174069

GI



AB Nonlinear optically active compds. having a  $\pi$ -donor moiety covalently coupled to a  $\pi$ -acceptor moiety through a  $\pi$ -electron conjugated bridge moiety are prepared by irradiating with microwave irradiation a combination of a  $\pi$ -acceptor compound (I; R1 is at least one of alkyl, aryl, or heteroalkyl group; R2 is at least one of alkyl, aryl, or heteroalkyl group; A1 is at least one of alkyl, aryl, or any electron withdrawing group; A2 is an electron withdrawing group; A3 is an electron withdrawing group; X is at least one of O, S, or CH<sub>2</sub>) and a compound having a  $\pi$ -donor moiety covalently coupled to a  $\pi$ -electron conjugated bridge moiety. Also disclosed are macrostructures that include nonlinear optically active components, and devices including the nonlinear optically active compds. and the macrostructures. Thus, a mixture of N,N-dibutyl-4-[(1E,3E)-4-(3-tert-butyl dimethylsiloxy-5-formylthien-2-yl)-1,3-butadienyl]aniline (102 mg, 0.2 mmol) and 2-dicyanomethylene-3-cyano-4,5-dimethyl-5-trifluoromethyl-2,5-dihydrofuran (51 mg, 0.2 mmol) in 1 mL ethanol was irradiated under focused microwave 20 W for 8 min and the resulting mixture was concentrated and purified through a flash chromatog. on silica gel with a gradient eluent of hexanes/ethyl acetate (20/1-9/1) to give 85 mg of product (II) as dark solid (57 %). A solution of 26 weight% II/poly(Me methacrylate) (guest/host polymer) in cyclopentanone was spin-coated onto half-etched ITO glass substrate to give a film (1.2  $\mu$ m thickness) with good optical quality which was hard-baked under vacuum at 65° for >12 h to remove residual solvent. A thin layer of gold was sputtered on to the film as the top electrode to perform the high elec. field poling. After poling at 140° with 1 MV/cm for 5 min, an electrooptical coefficient of 116 pm/V was obtained at 1.3  $\mu$ m and retained over 85% of its original value up to 480 h when the stability of the electrooptical signal was monitored at 85° under vacuum.

IT 369609-49-4P, 2-(Dicyanomethylene)-3-cyano-4,5-dimethyl-5-trifluoromethyl-2,5-dihydrofuran

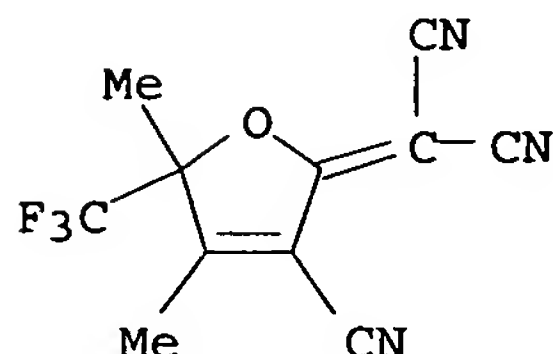
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT

(Reactant or reagent)

(intermediate; preparation of 2,5-dihydrofuran-linked thiophene derivs.  
having conjugated double bonds as nonlinear optical materials)

RN 369609-49-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



IT 613237-39-1P 613237-40-4P

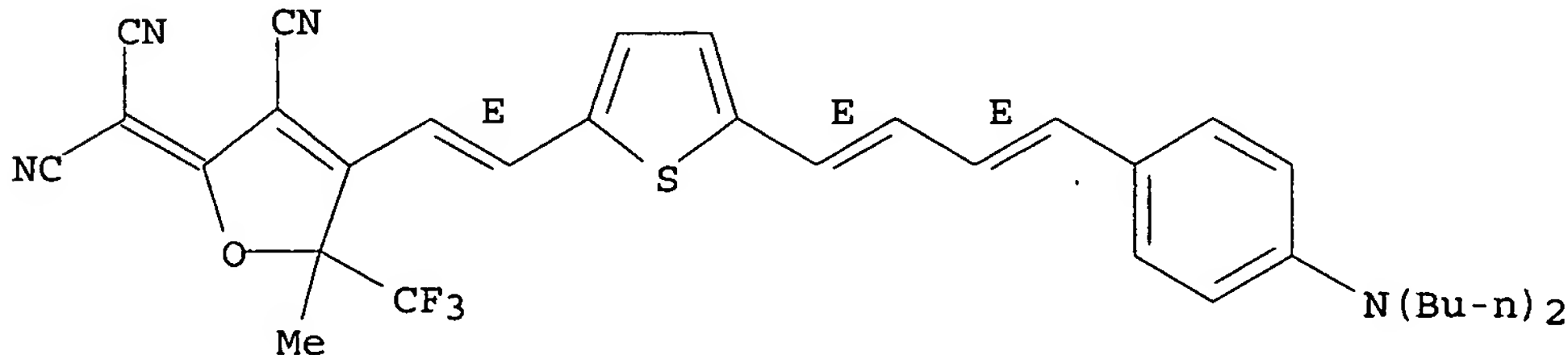
RL: DEV (Device component use); PRP (Properties); SPN (Synthetic  
preparation); TEM (Technical or engineered material use); PREP  
(Preparation); USES (Uses)

(preparation of 2,5-dihydrofuran-linked thiophene derivs. having conjugated  
double bonds as nonlinear optical materials)

RN 613237-39-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-  
(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-  
(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

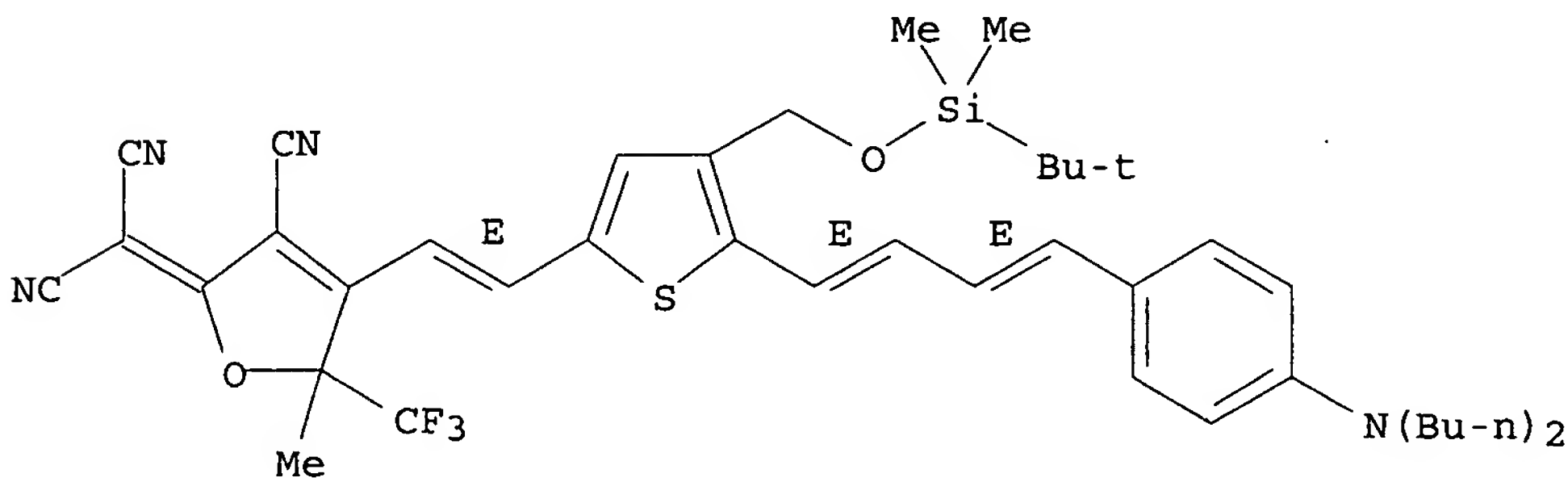
Double bond geometry as shown.



RN 613237-40-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-  
(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-  
dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-  
(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.





REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 10 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:569556 HCAPLUS  
 DOCUMENT NUMBER: 141:130999  
 TITLE: Nonlinear optical compounds and methods for their preparation  
 INVENTOR(S): Jen, Kwan-Yue; Ma, Hong; Liu, Sen; Dalton, Larry R.  
 PATENT ASSIGNEE(S): University of Washington, USA  
 SOURCE: U.S. Pat. Appl. Publ., 39 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004135130	A1	20040715	US 2003-347117	20030115
PRIORITY APPLN. INFO.:			US 2003-347117	20030115

OTHER SOURCE(S): MARPAT 141:130999

AB Nonlinear optically active compds., methods for making nonlinear optically active compds., compds. useful for making nonlinear optically active compds., methods for making compds. useful for making nonlinear optically active compds., macrostructures that include nonlinear optically active components, and devices including the nonlinear optically active compds. and the macrostructures.

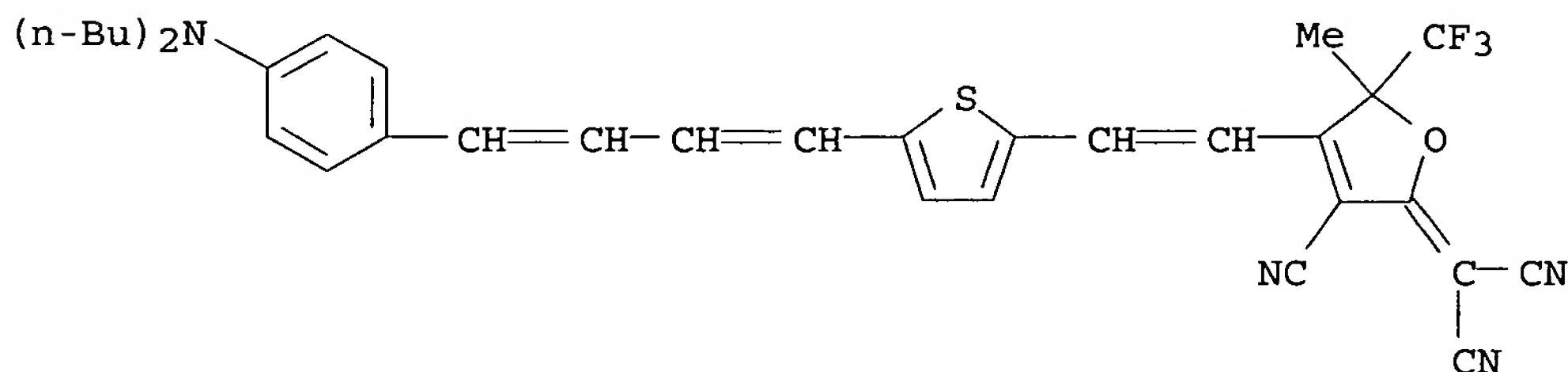
IT 721969-04-6P 721969-10-4P

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses).

(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

RN 721969-04-6 HCAPLUS

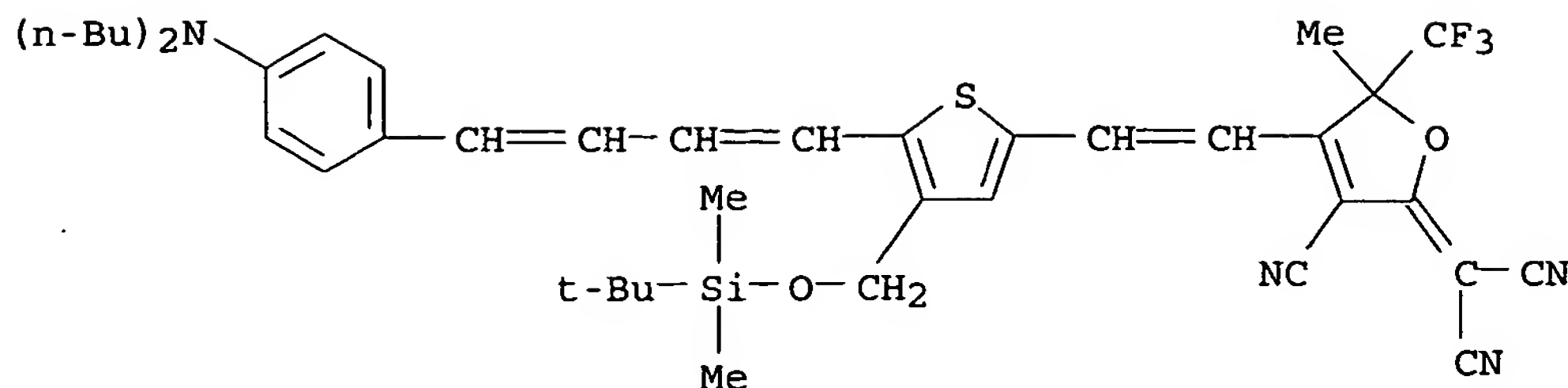
CN Propanedinitrile, [3-cyano-4-[2-[5-[4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furylidene]- (9CI) (CA INDEX NAME)



RN 721969-10-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furylidene]- (9CI) (CA INDEX NAME)





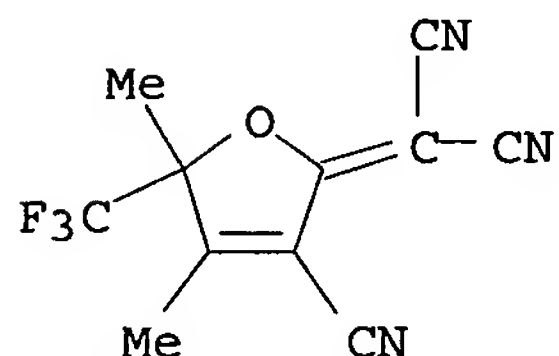
IT 369609-49-4P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(preparation and electrooptical properties of compds. with aniline moiety donor, tricyanodihydrofuran acceptor and thiophene bridge)

RN 369609-49-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



L8 ANSWER 11 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:550794 HCAPLUS

DOCUMENT NUMBER: 141:106890

TITLE: Polymers having pendant nonlinear optical chromophores and electro-optic devices made from them

INVENTOR(S): Huang, Diyun; Chen, Baoquan

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 23 pp., Cont.-in-part of U.S. Ser. No. 395,610.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 5

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2004132960	A1	20040708	US 2003-625371	20030723
US 2002160282	A1	20021031	US 2001-932831	20010817
US 6716995	B2	20040406		
US 2003107027	A1	20030612	US 2002-301978	20021122
US 6750603	B2	20040615		
US 2003183812	A1	20031002	US 2003-395610	20030324
WO 2004048927	A2	20040610	WO 2003-US37180	20031119

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM,

PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN,  
 TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW  
 RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ,  
 BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE,  
 ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,  
 TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

## PRIORITY APPLN. INFO.:

US 2000-226267P P 20000817  
 US 2001-932831 A2 20010817  
 US 2002-301978 A1 20021122  
 US 2003-395610 A2 20030324  
 US 2003-625371 A2 20030723

AB The invention relates to a nonlinear optical chromophore having the formula D- $\pi$ -A, wherein  $\pi$  is a  $\pi$  bridge including a thiophene ring having oxygen atoms bonded directly to the 3 and 4 positions of the thiophene ring, D is a donor, and A is an acceptor, and compns. that include a linear polymer and the chromophore as a pendant group.

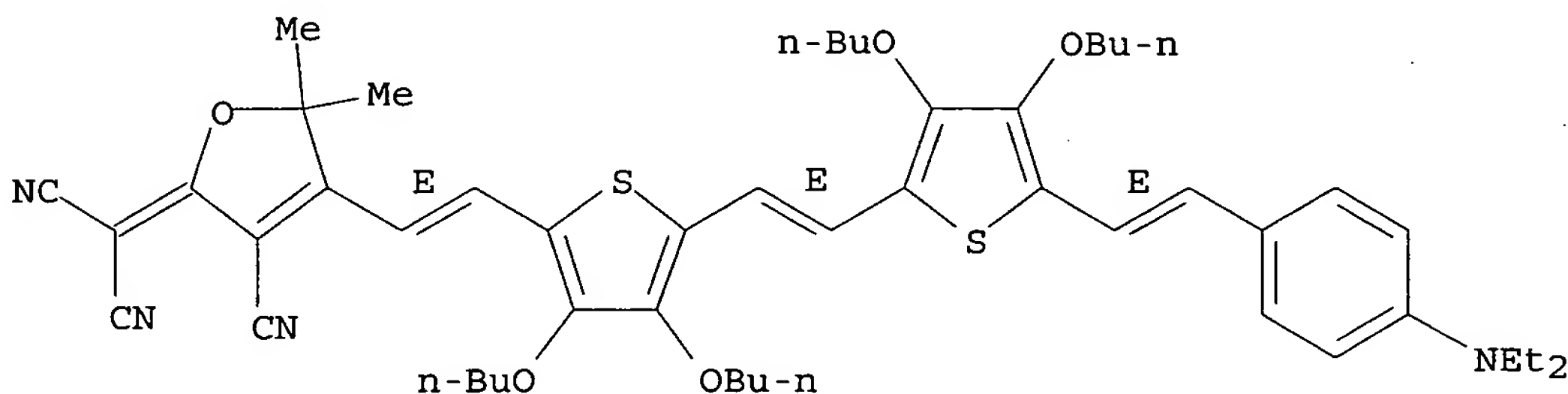
IT 540777-74-0P

RL: IMF (Industrial manufacture); MOA (Modifier or additive use); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses) (chromophores; polymers having pendant nonlinear optical chromophores and electro-optic devices made from them)

RN 540777-74-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 540777-76-2P 540777-77-3P 540777-78-4P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

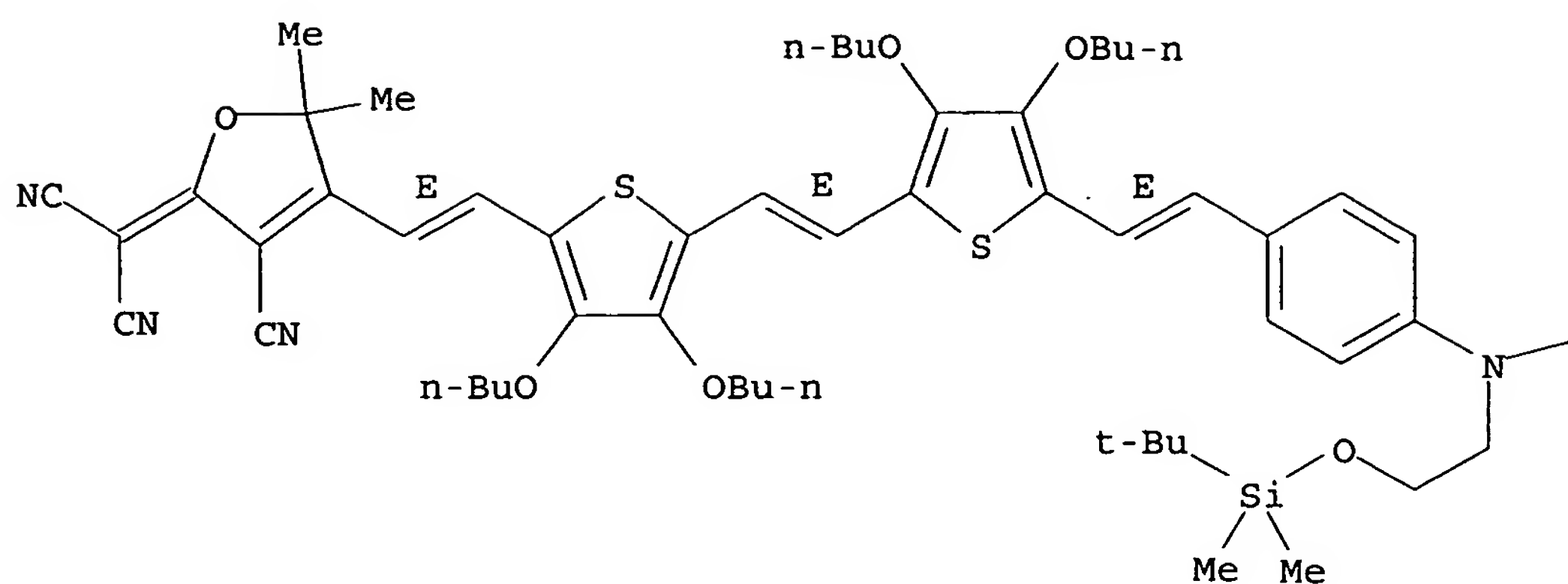
(polymers having pendant nonlinear optical chromophores and electro-optic devices made from them)

RN 540777-76-2 HCAPLUS

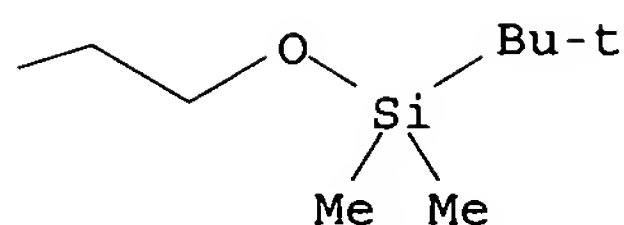
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

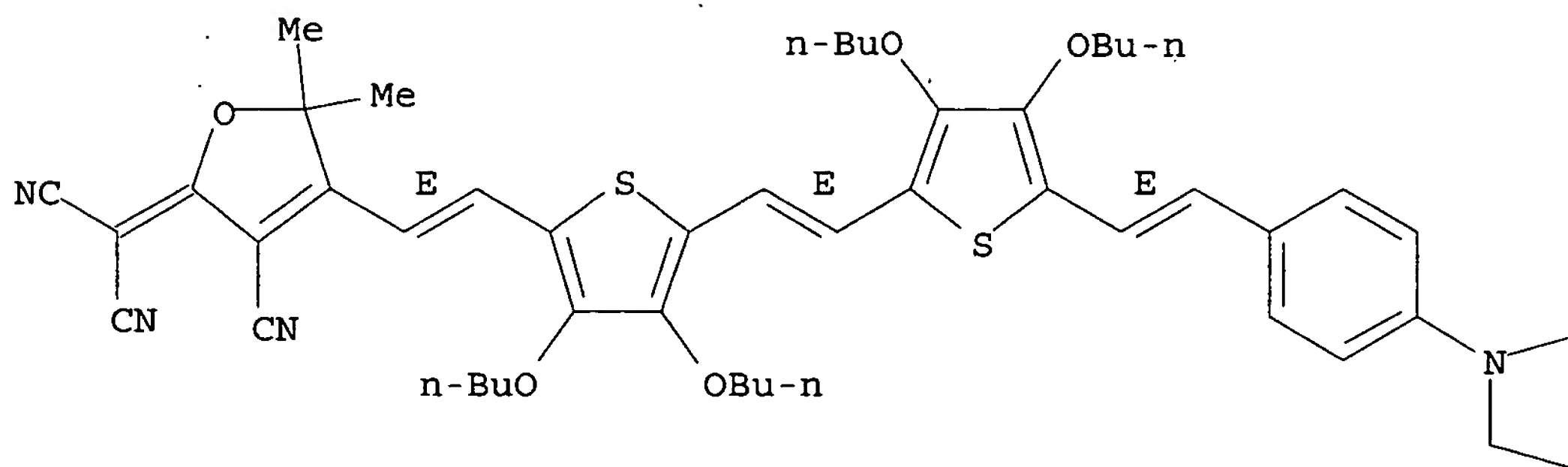


RN 540777-77-3 HCAPLUS

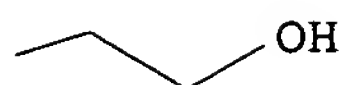
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

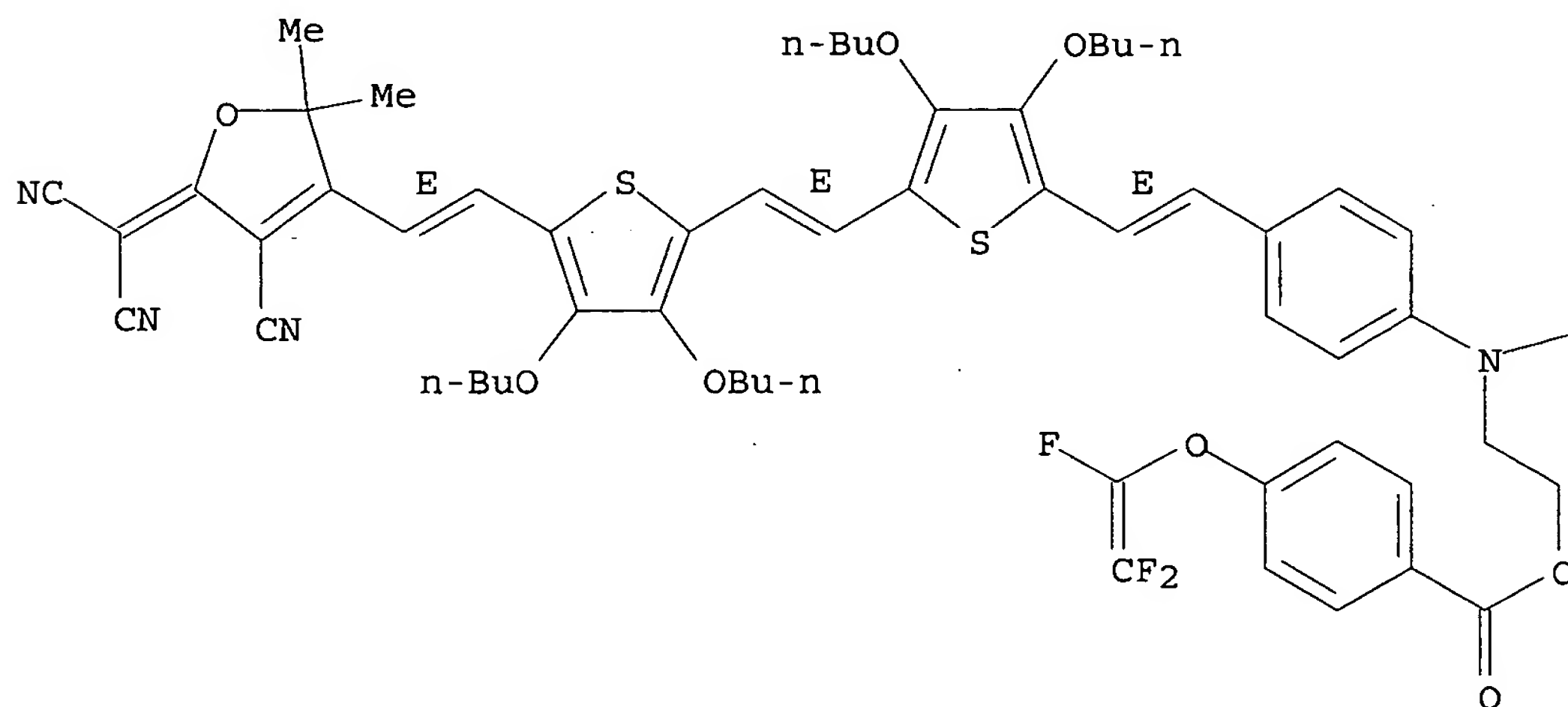


RN 540777-78-4 HCAPLUS

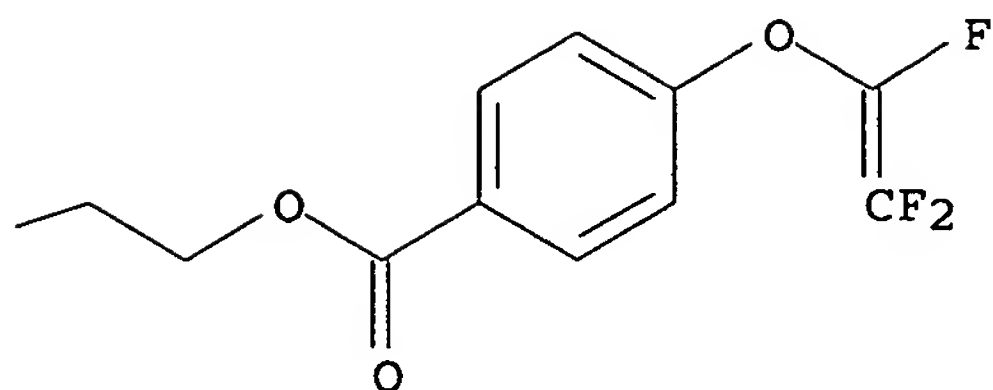
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

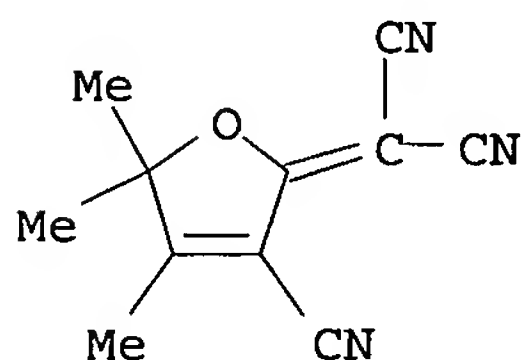


IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)  
 (polymers having pendant nonlinear optical chromophores and  
 electro-optic devices made from them)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA  
 INDEX NAME)



L8 ANSWER 12 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:471043 HCAPLUS

DOCUMENT NUMBER: 141:44659

TITLE: Second order nonlinear optical chromophores, polymers,  
 and electro-optic devices

INVENTOR(S): Huang, Diyun; Chen, Baoquan

PATENT ASSIGNEE(S): Lumera Corporation, USA

SOURCE: PCT Int. Appl., 36 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 5

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2004048927	A2	20040610	WO 2003-US37180	20031119
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW			
RW:	BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK,			

TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

US 2003107027 A1 20030612 US 2002-301978 20021122

US 6750603 B2 20040615

US 2004132960 A1 20040708 US 2003-625371 20030723

PRIORITY APPLN. INFO.:

US 2002-301978 A2 20021122

US 2003-625371 A2 20030723

US 2000-226267P P 20000817

US 2001-932831 A2 20010817

US 2003-395610 A2 20030324

AB The invention refers to a nonlinear optical chromophore D- $\pi$ -A, wherein  $\pi$  is a  $\pi$  bridge including a thiophene ring having O atoms bonded directly to the 3 and 4 positions of the thiophene ring, D is a donor, and A is an acceptor, and compns. that include a linear polymer and the chromophore as a pendant group.

IT 540777-78-4P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

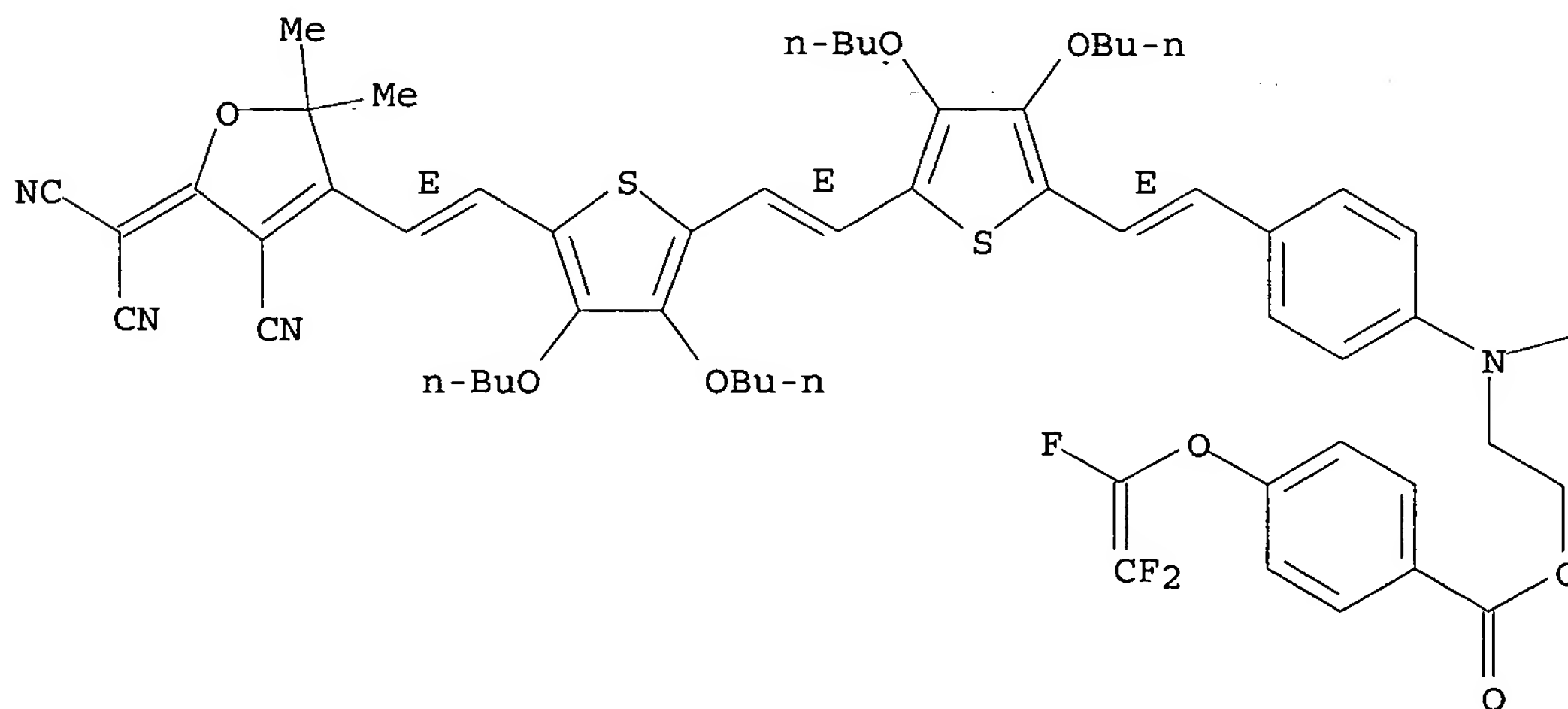
(second order nonlinear optical chromophores, polymers containing same, and electro-optic devices therefrom)

RN 540777-78-4 HCAPLUS

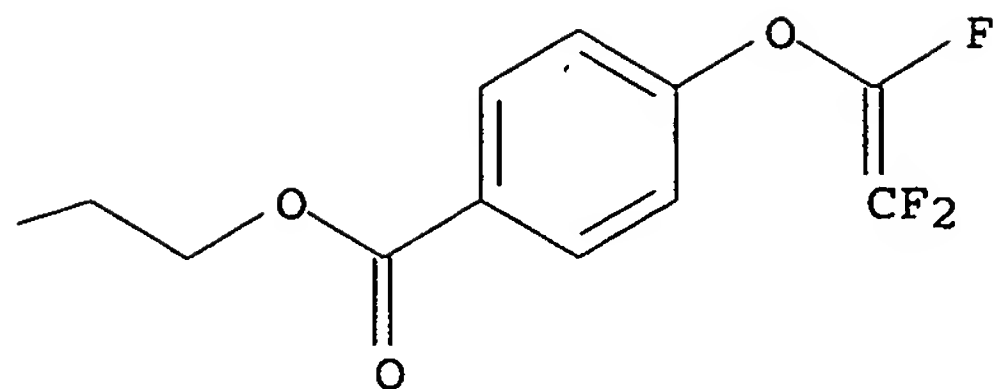
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



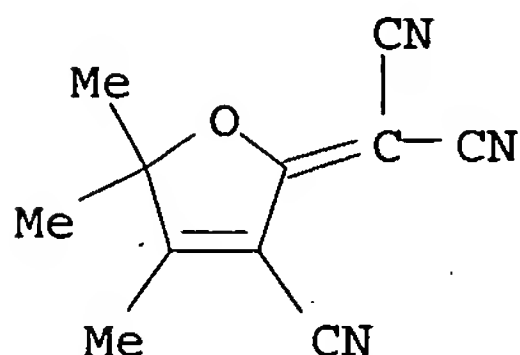
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(second order nonlinear optical chromophores, polymers containing same, and electro-optic devices therefrom)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



IT 540777-74-0P 540777-76-2P 540777-77-3P

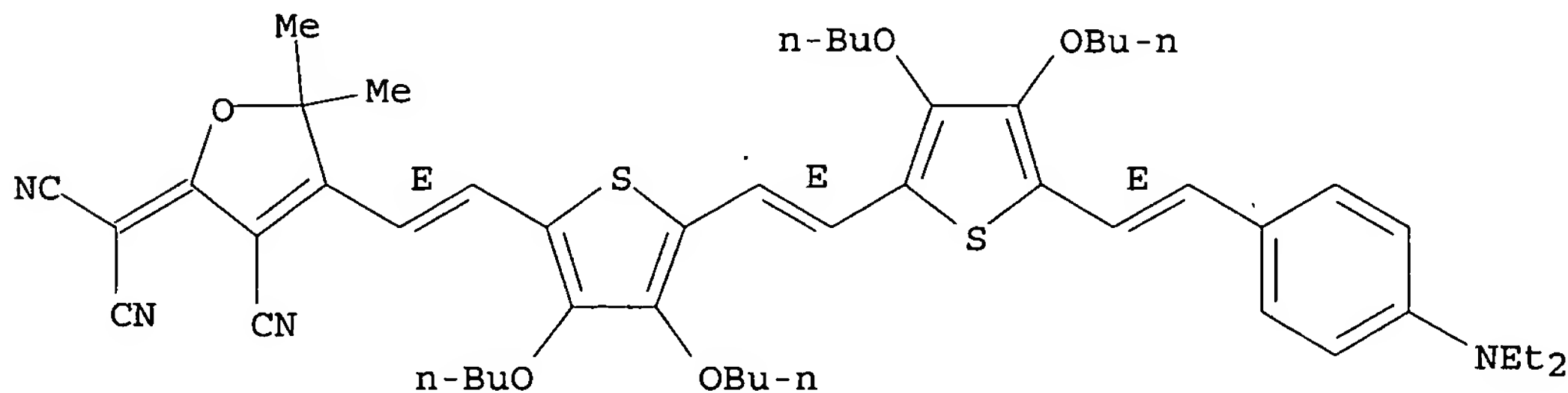
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(second order nonlinear optical chromophores, polymers containing same, and electro-optic devices therefrom)

RN 540777-74-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 540777-76-2 HCAPLUS

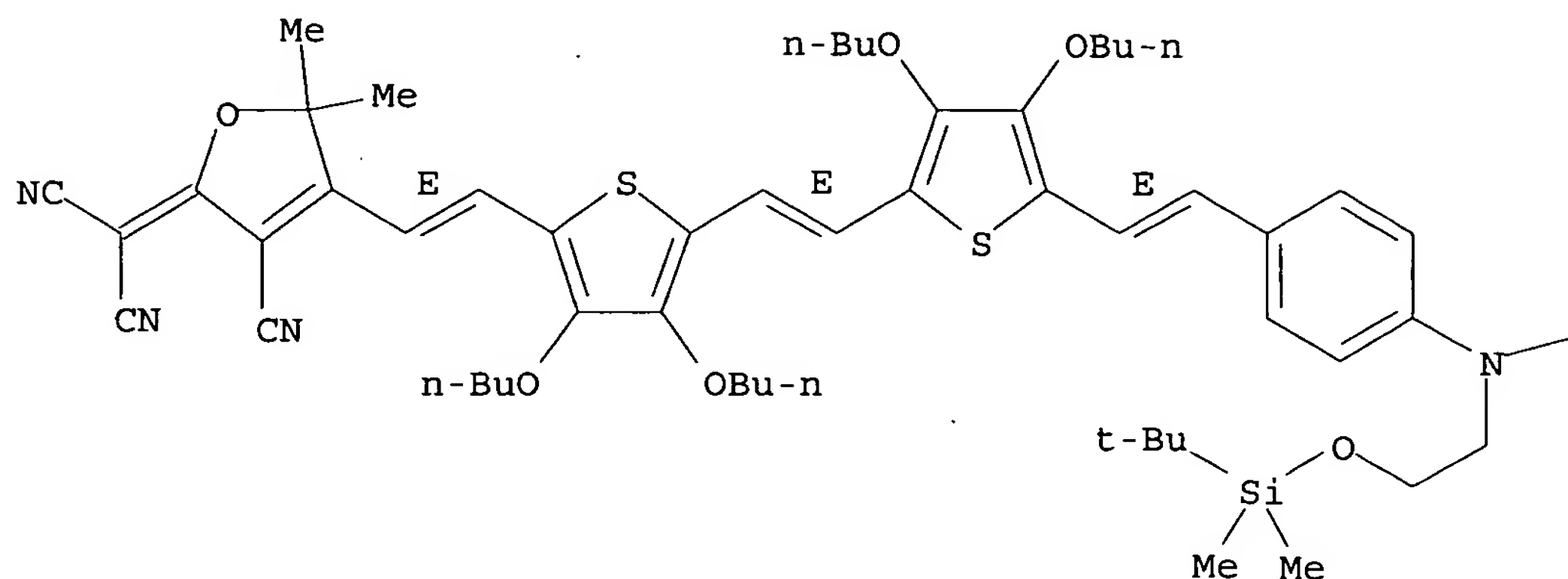
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-



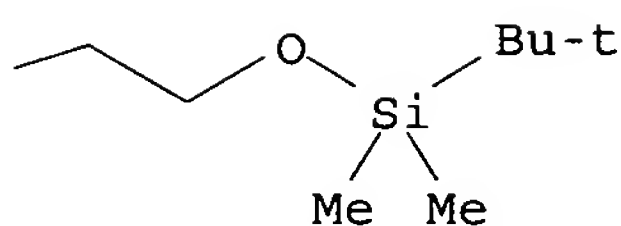
2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

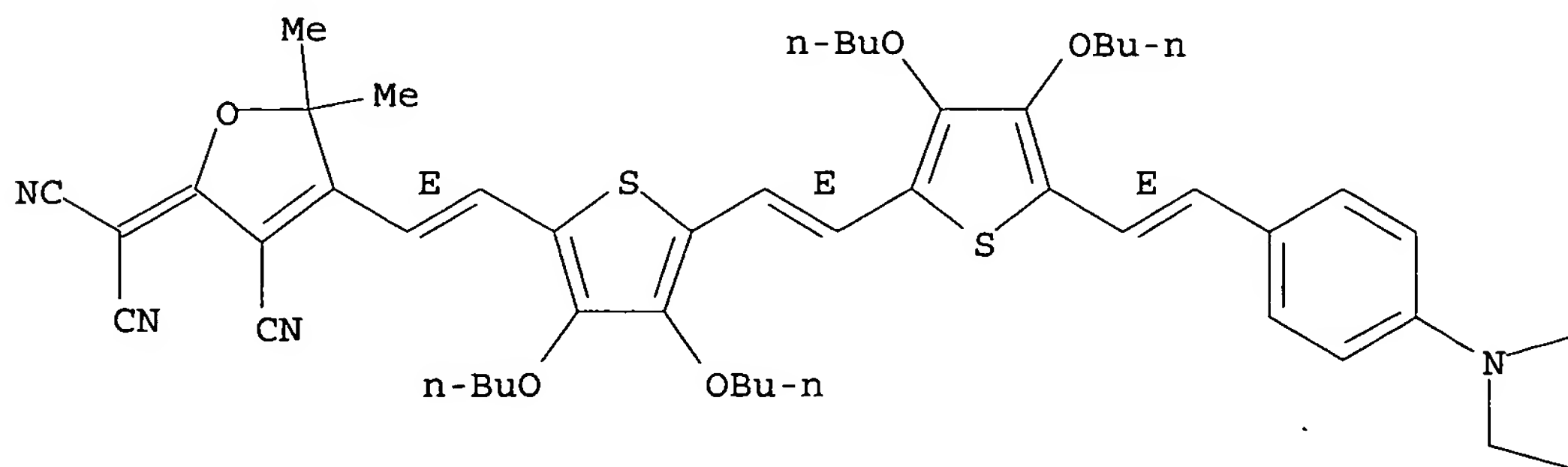


RN 540777-77-3 HCAPLUS

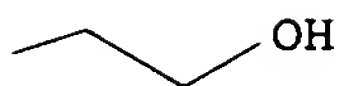
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



L8 ANSWER 13 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:414988 HCAPLUS

DOCUMENT NUMBER: 141:164347

TITLE: Near-Infrared Optical Absorption Behavior in High- $\beta$  Nonlinear Optical Chromophore-Polymer Guest-Host Materials. 1. Continuum Dielectric Effects in Polycarbonate Hosts

AUTHOR(S): Barto, Richard R., Jr.; Frank, Curtis W.; Bedworth, Peter V.; Ermer, Susan; Taylor, Rebecca E.

CORPORATE SOURCE: Departments of Materials Science and Engineering and of Chemical Engineering, Stanford University, Stanford, CA, 94304, USA

SOURCE: Journal of Physical Chemistry B (2004), 108(25), 8702-8715

CODEN: JPCBFK; ISSN: 1520-6106

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Optical waveguide technologies have been identified for broadband applications related to fiber network, airborne, and space-based communications. Active waveguide technologies developed around nonlinear optical (NLO) dye/polymer-based electrooptic devices have distinct advantages over existing RF communications in terms of cost, weight, size, bandwidth, and immunity to electromagnetic interference, but their ultimate applicability may be governed by optical loss. Though much attention has been given to the influences of the NLO chromophore optical nonlinearity, geometry, concentration, and poling effects on the bulk material nonlinearity and device performance, less attention has been directed at the effects of the component material properties and dye concentration on fundamental near-IR optical absorption. We investigate here the effects of polymer structural variations within the Bisphenol A polycarbonate family on near-IR absorption behavior of guest-host materials, holding the dye constant, over a range of dye concns. Solvatochromism plays an important role in the near-IR absorption loss of a particular NLO dye, (2-(3-cyano-4-{2-[5-(2-{4-[ethyl(2-methoxyethyl)amino]phenyl}vinyl)-3,4-diethylthiophen-2-yl]vinyl}-5,5-dimethyl-5H-furan-2-ylidene)malononitrile). Near-IR loss vs. dye absorption spectral shifts can be understood in terms of dye-polymer interaction energies within the context of Marcus' theory of polar contributions to initial and final electronic state free energies. The peak shift behavior can be described

by the solvent polarity function of the polymer host, consistent with the Onsager continuum dielec. model. Anal. of the geometric parameters intrinsic to the generalized Kowski solvent polarity correlation suggests a more spherical dye shape can lead to reduced near-IR loss. The loss vs. concentration results show that selection of a low-loss host polymer is a necessary but insufficient condition for establishing acceptable loss in a doped NLO dye-polymer system.

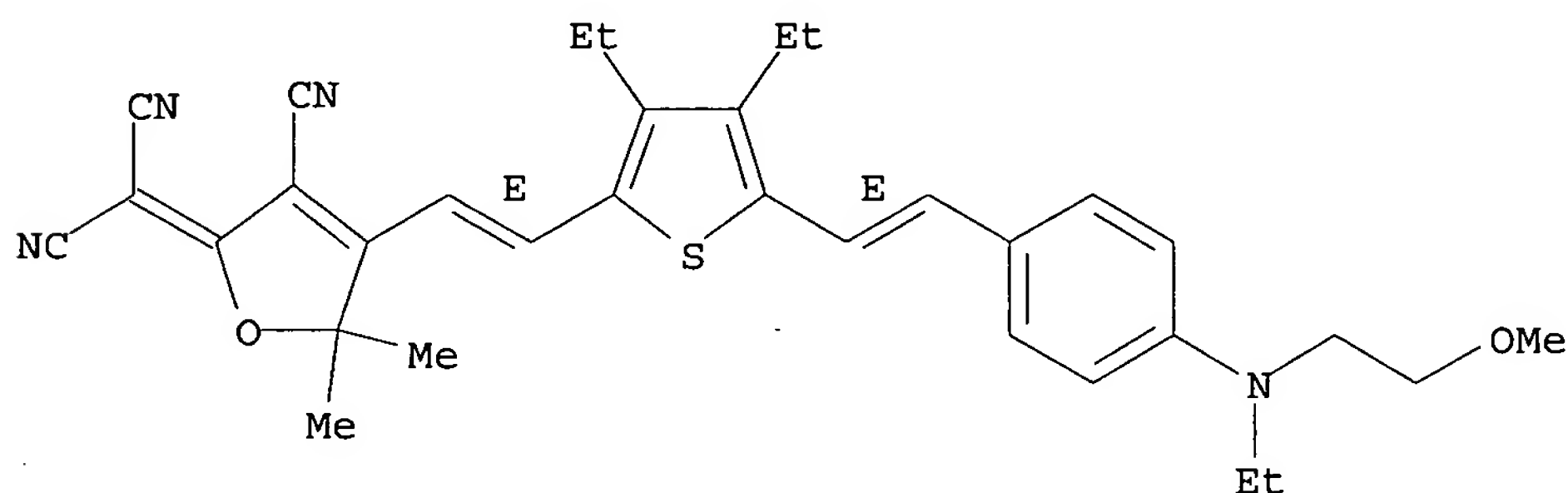
IT 676256-53-4

RL: MOA (Modifier or additive use); PRP (Properties); USES (Uses)  
(dye dopant; near-IR optical absorption behavior in high- $\beta$  nonlinear optical chromophore-polymer guest-host materials-continuum dielec. effects in polycarbonate hosts)

RN 676256-53-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-diethyl-5-[(1E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 82 THERE ARE 82 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 14 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:402609 HCAPLUS

DOCUMENT NUMBER: 141:147753

TITLE: Photostability of High  $\mu\beta$  Electro-Optic Chromophores at 1550 nm

AUTHOR(S): DeRosa, Michael E.; He, Mingqian; Cites, Jeffrey S.; Garner, Sean M.; Tang, Y. Ruby

CORPORATE SOURCE: Science Technology Division, Corning Incorporated, Corning, NY, 14831, USA

SOURCE: Journal of Physical Chemistry B (2004), 108(25), 8725-8730

CODEN: JPCBFK; ISSN: 1520-6106

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The authors present the photostability results of seven novel electrooptic chromophores made to be used in high-speed fiber optic signal modulators. The authors measured the photobleaching rate of the chromophores at room temperature by using a fiber optic pump-probe technique. Thin polymer film guest-host samples were deposited on the end of SMF-28 fiber pigtailed and bleached by using 100 mW of 1550 nm radiation as the pump. The bleaching rate was measured by monitoring the main absorption band of the chromophores by using a 660 nm probe beam that was multiplexed into the fiber pigtail. The relative photostability is reported as a figure of

merit which is proportional to the  $1/e$  bleaching lifetime of the chromophore. The authors found the bleaching rate to increase linearly with incident 1550 nm power at the end of the single-mode fiber up to at least 100 mW. The authors' results show that the photobleaching rate is reduced dramatically when the test is conducted in an inert atmosphere. Also

the

presence of the singlet O quencher DABCO can be used to increase the lifetime of the chromophore. The effect that chromophore structure and polymer host type have on photostability are also discussed.

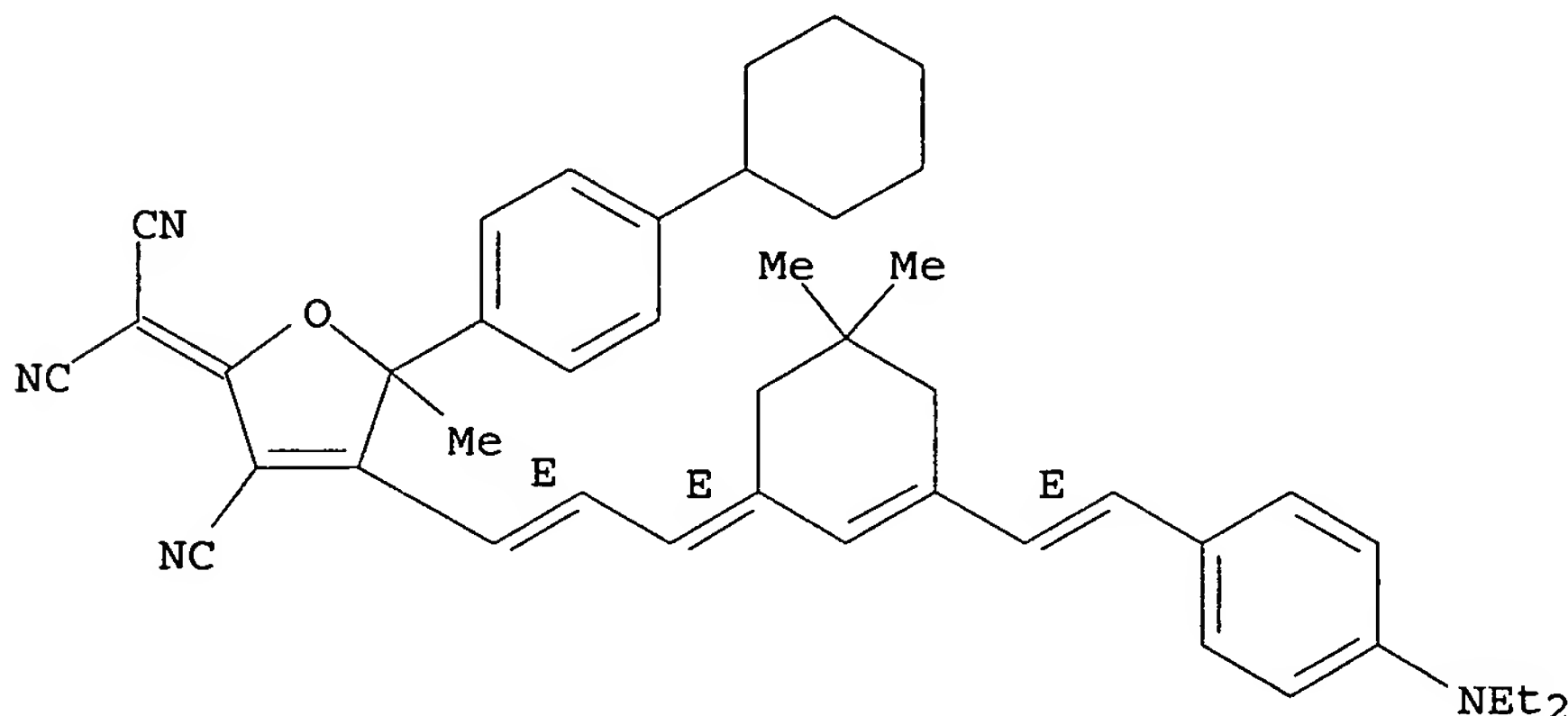
IT 477741-14-3 477892-36-7 709656-40-6  
709656-41-7 709656-44-0 709656-45-1  
709656-47-3

RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(photostability of high  $\mu\beta$  electro-optic chromophores at 1550  
nm using in fiber optics modulators)

RN 477741-14-3 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

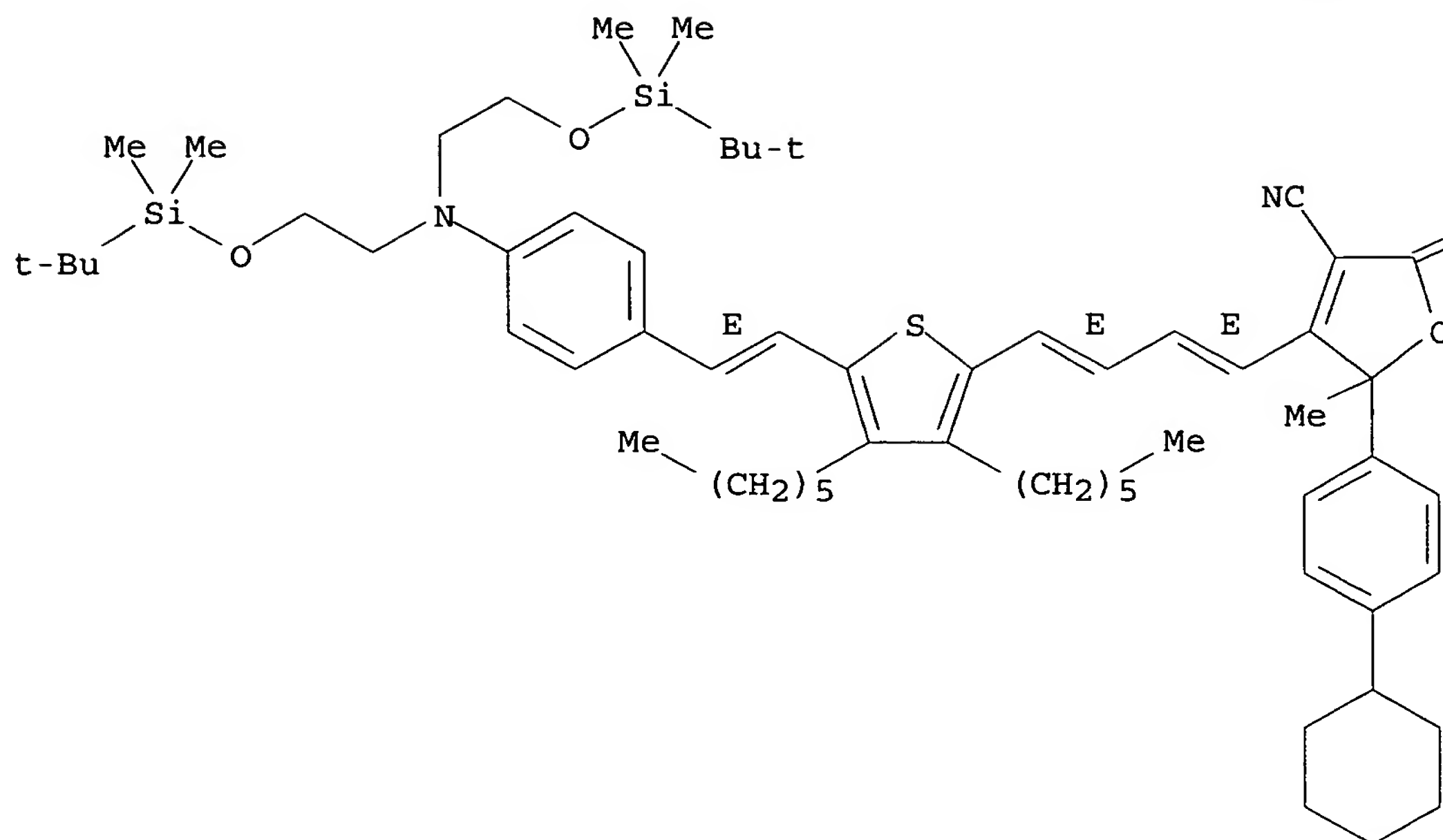


RN 477892-36-7 HCAPLUS

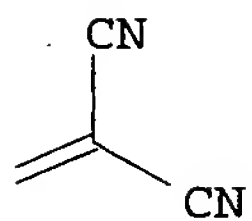
CN Propanedinitrile, [4-[(1E,3E)-4-[5-[(1E)-2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-3,4-dihexyl-2-thienyl]-1,3-butadienyl]-3-cyano-5-(4-cyclohexylphenyl)-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A

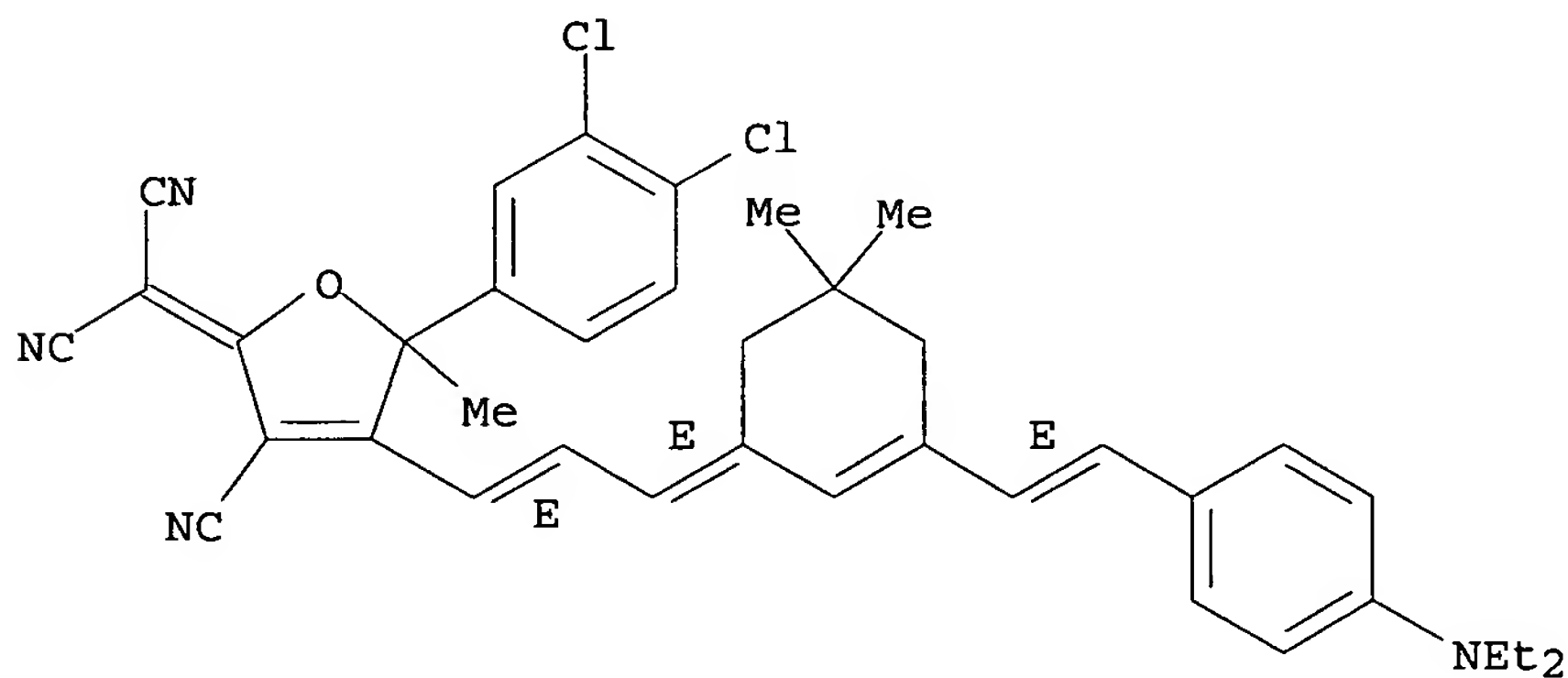


PAGE 1-B



RN 709656-40-6 HCAPLUS  
 CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

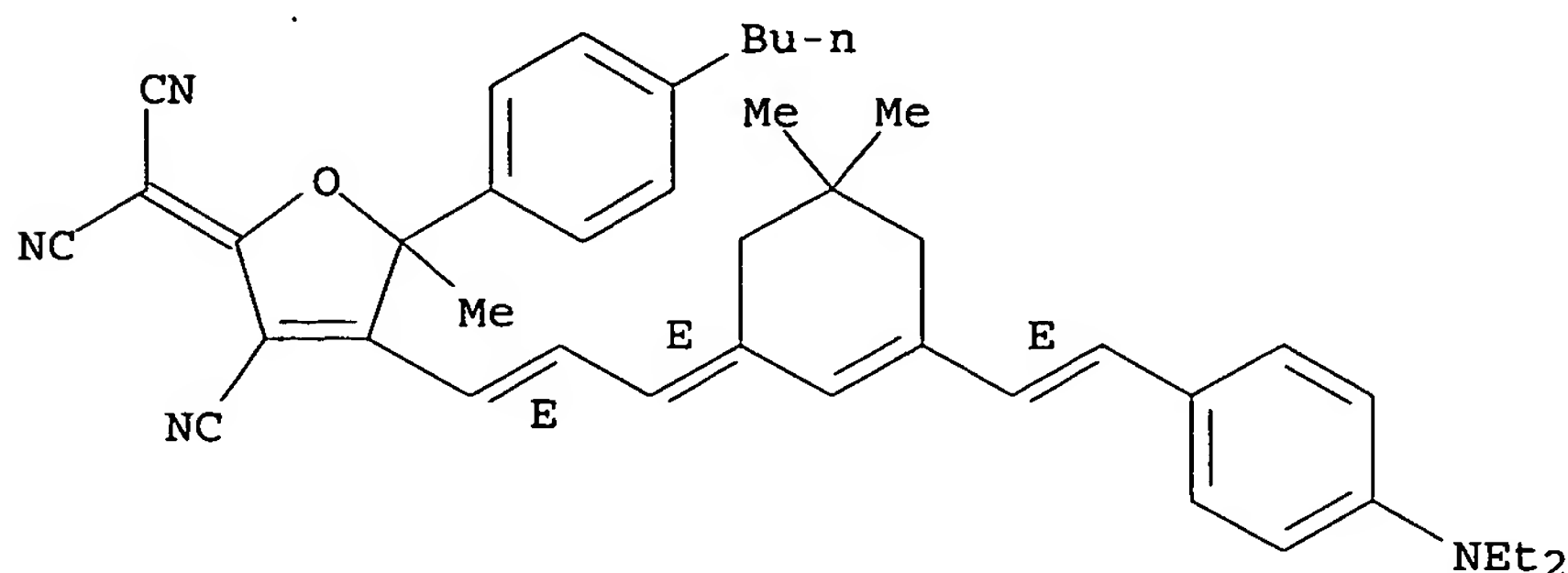
Double bond geometry as shown.



RN 709656-41-7 HCAPLUS

CN Propanedinitrile, [5-(4-butylphenyl)-3-cyano-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

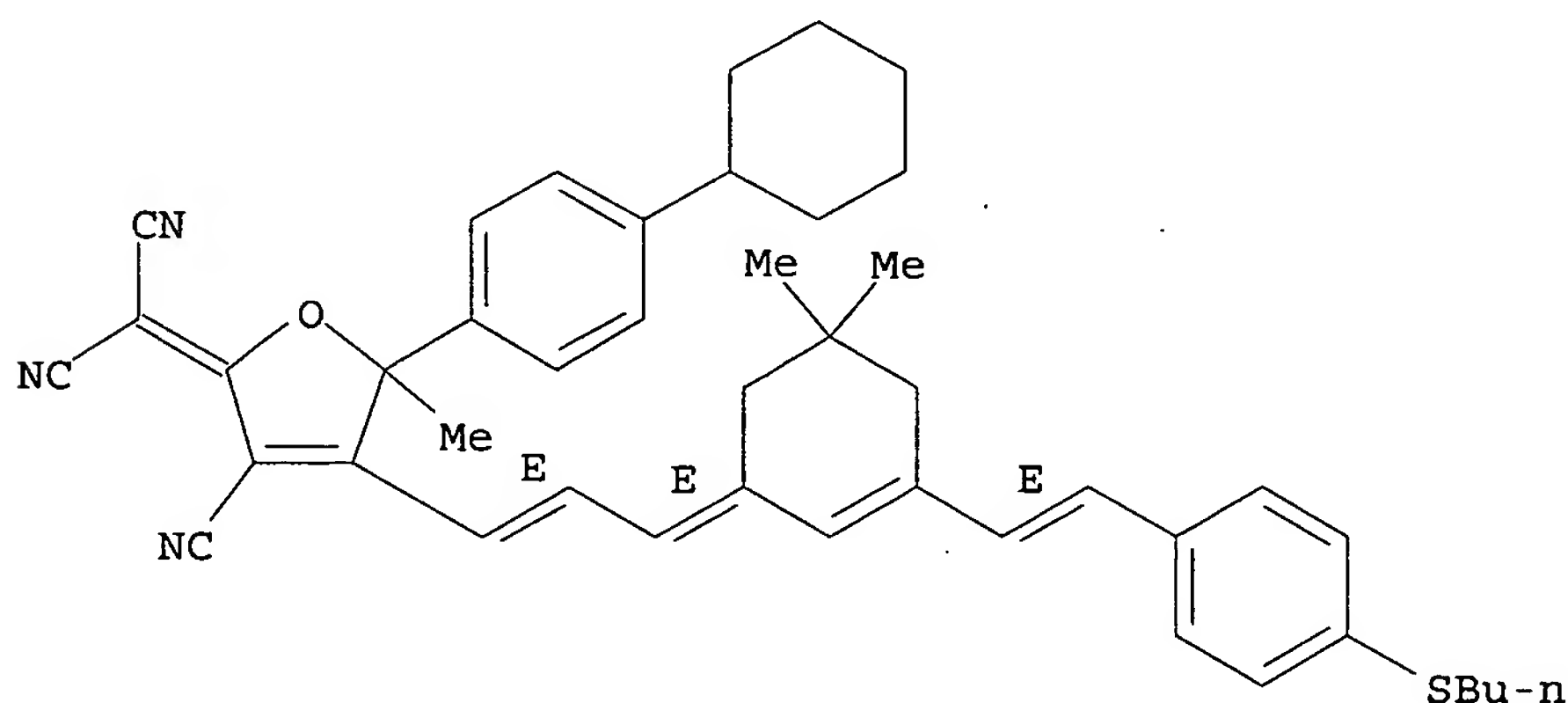
Double bond geometry as shown.



RN 709656-44-0 HCAPLUS

CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-(butylthio)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-(4-cyclohexylphenyl)-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

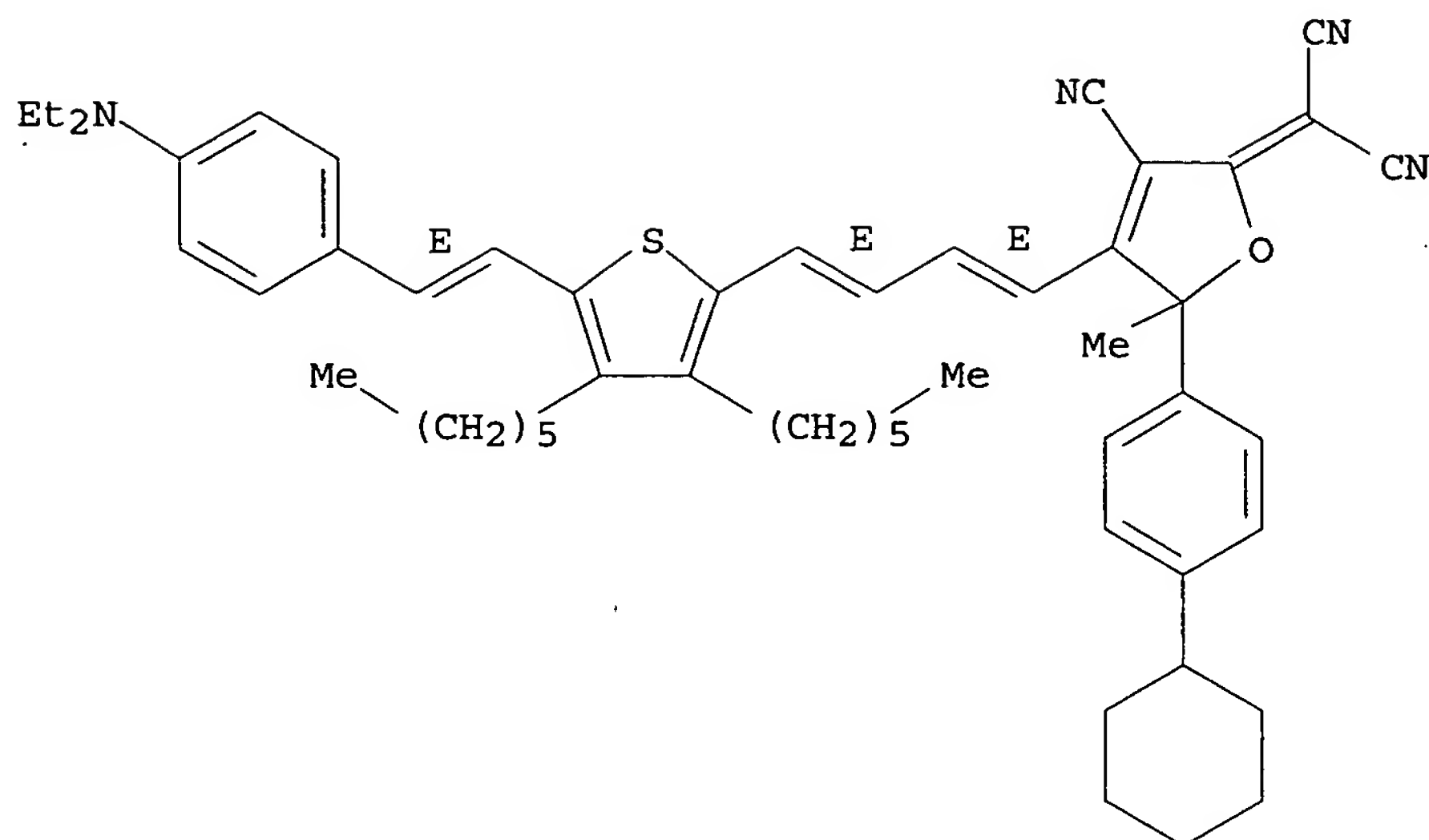
Double bond geometry as shown.



RN 709656-45-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[(1E,3E)-4-[5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-3,4-dihexyl-2-thienyl]-1,3-butadienyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

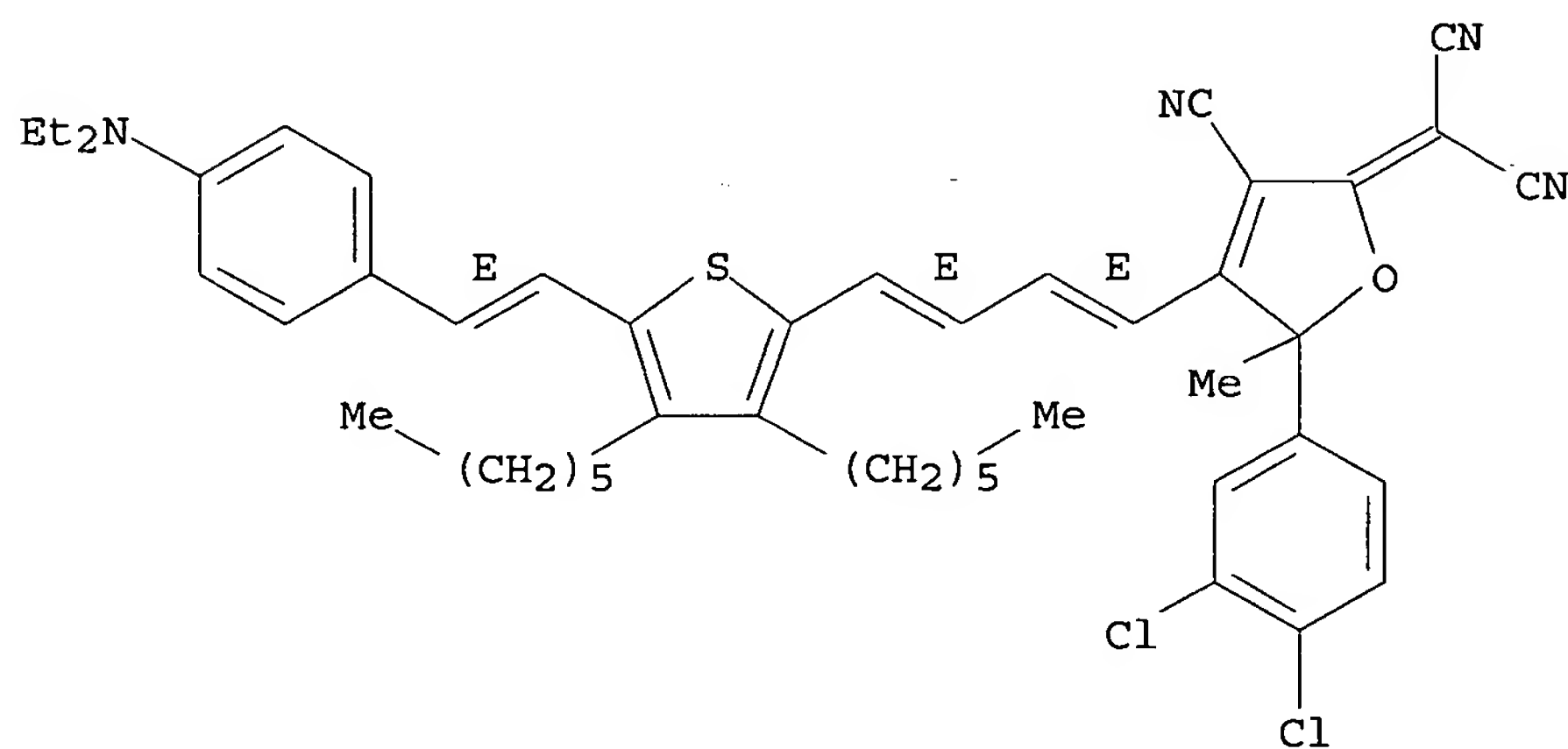
Double bond geometry as shown.



RN 709656-47-3 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4-[(1E,3E)-4-[5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-3,4-dihexyl-2-thienyl]-1,3-butadienyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 15 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:363468 HCAPLUS  
 DOCUMENT NUMBER: 141:147747  
 TITLE: Efficient Electrooptic Polymers for THz Applications  
 AUTHOR(S): Sinyukov, Alexander M.; Hayden, L. Michael  
 CORPORATE SOURCE: Department of Physics, University of Maryland,  
 Baltimore, MD, 21250, USA  
 SOURCE: Journal of Physical Chemistry B (2004), 108(25),  
 8515-8522  
 CODEN: JPCBFK; ISSN: 1520-6106  
 PUBLISHER: American Chemical Society



DOCUMENT TYPE: Journal  
LANGUAGE: English

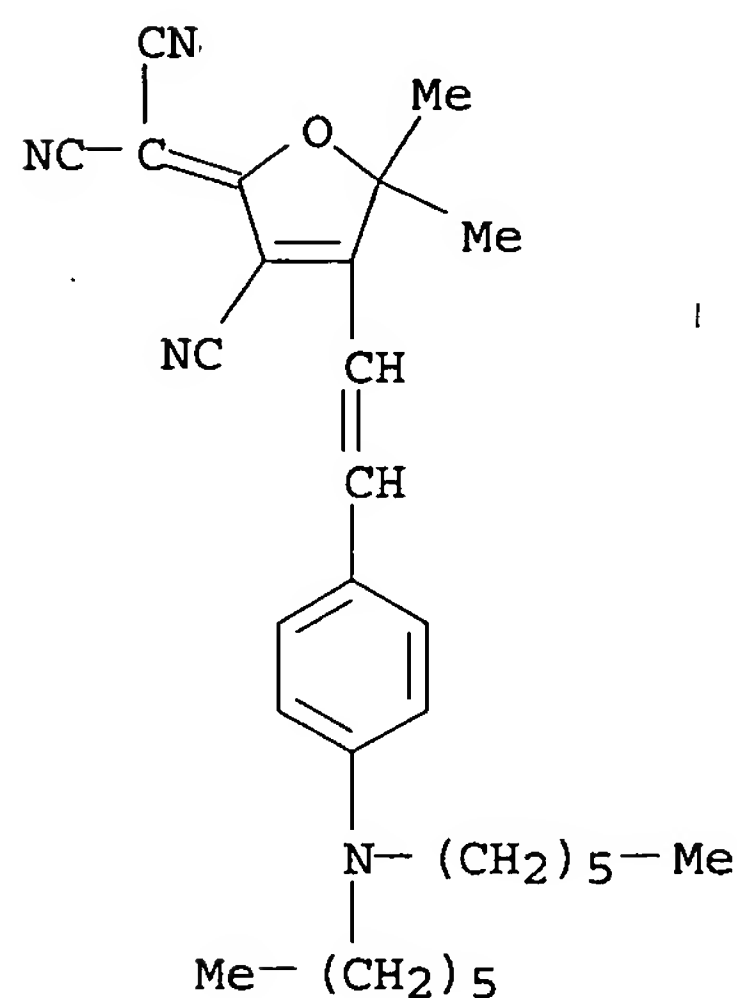
AB The authors present a method for producing electrooptic (EO) polymer films with EO coeffs. 40-50 pm/V at 785 nm which are suitable for use as emitters and sensors of THz radiation. Direct comparison with ZnTe shows that the authors' EO polymers are more efficient THz emitters than ZnTe. The THz field generated from a 80  $\mu$ m thick poled polymer film is that generated from a 1 mm thick ZnTe crystal. A model for the THz generation via optical rectification from a poled polymer was developed and verified exptl. in a THz system using a polymer emitter and a ZnTe sensor.

IT 634202-68-9 634202-69-0

RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(efficient electrooptic polymers for THz applications)

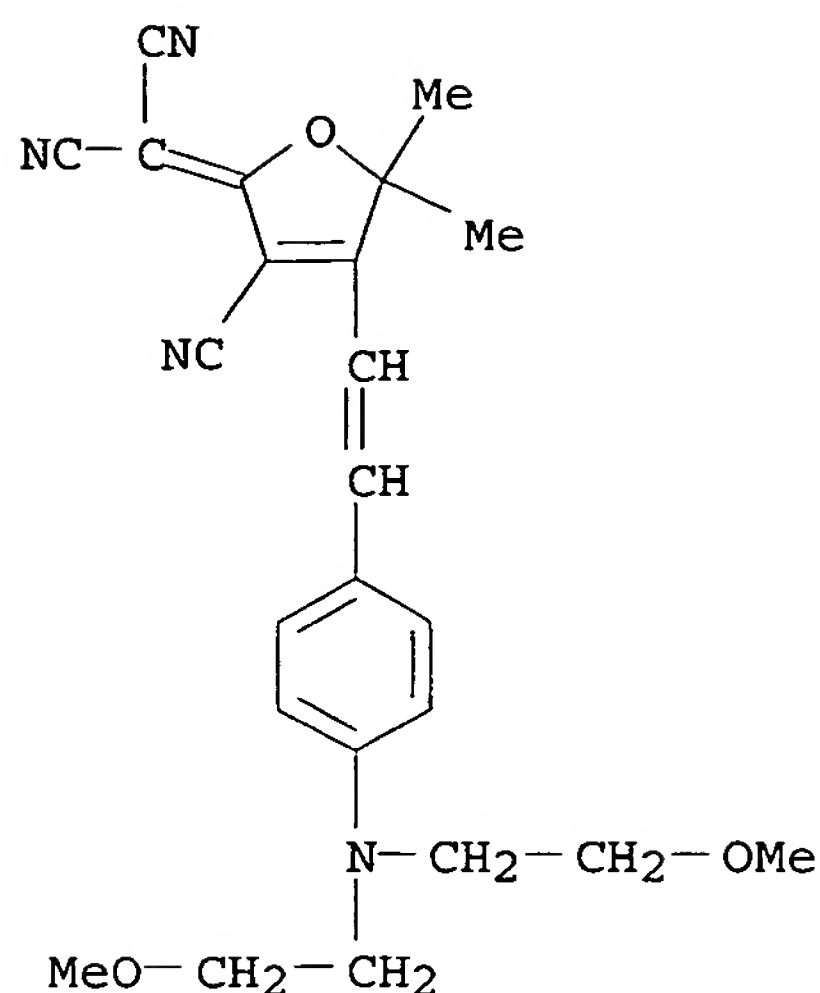
RN 634202-68-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[4-(dihexylamino)phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



RN 634202-69-0 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 39 THERE ARE 39 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 16 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:355378 HCAPLUS

DOCUMENT NUMBER: 141:113967

TITLE: Fabrication and Replication of Polymer Integrated Optical Devices Using Electron-Beam Lithography and Soft Lithography

AUTHOR(S): Huang, Yanyi; Palocz, George T.; Yariv, Amnon; Zhang, Cheng; Dalton, Larry R.

CORPORATE SOURCE: Department of Applied Physics, California Institute of Technology, Pasadena, CA, 91125, USA

SOURCE: Journal of Physical Chemistry B (2004), 108(25), 8606-8613

CODEN: JPCBFK; ISSN: 1520-6106

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Polymeric integrated optical devices, including microring resonator optical filters and Mach-Zehnder interferometer modulators, fabricated by electron-beam lithog. and soft lithog. are considered in this article. Microring resonator optical filters made of SU-8 (MicroChem, Newton, MA), directly patterned by electron-beam lithog., demonstrate that SU-8 is a good candidate for high-precision, easily fabricated, and good-optical-quality passive integrated optical devices. Due to the electron-beam lithog. process, the coupling between the straight waveguide and the microring resonator is precisely controlled, and the critical coupling condition can be achieved. Addnl., films containing several devices patterned by electron-beam lithog. are peeled from the silicon substrate, yielding ultrathin all-polymer flexible free-standing microring resonator optical filters exhibiting up to -27 dB filtering extinction. Using a PDMS stamp, molded from these electron-beam-patterned microring resonator optical filters, identical replicas are fabricated by the soft lithog. molding technique. Soft lithog. is also applied to active polymer materials. A short 2-mm active-section prototype Mach-Zehnder interferometer modulator is made by the replica molding process, using CLD-1/APC electrooptic polymer as the core material. A reasonable intensity-modulation effect is observed by applying voltage to one arm of the

interferometer.

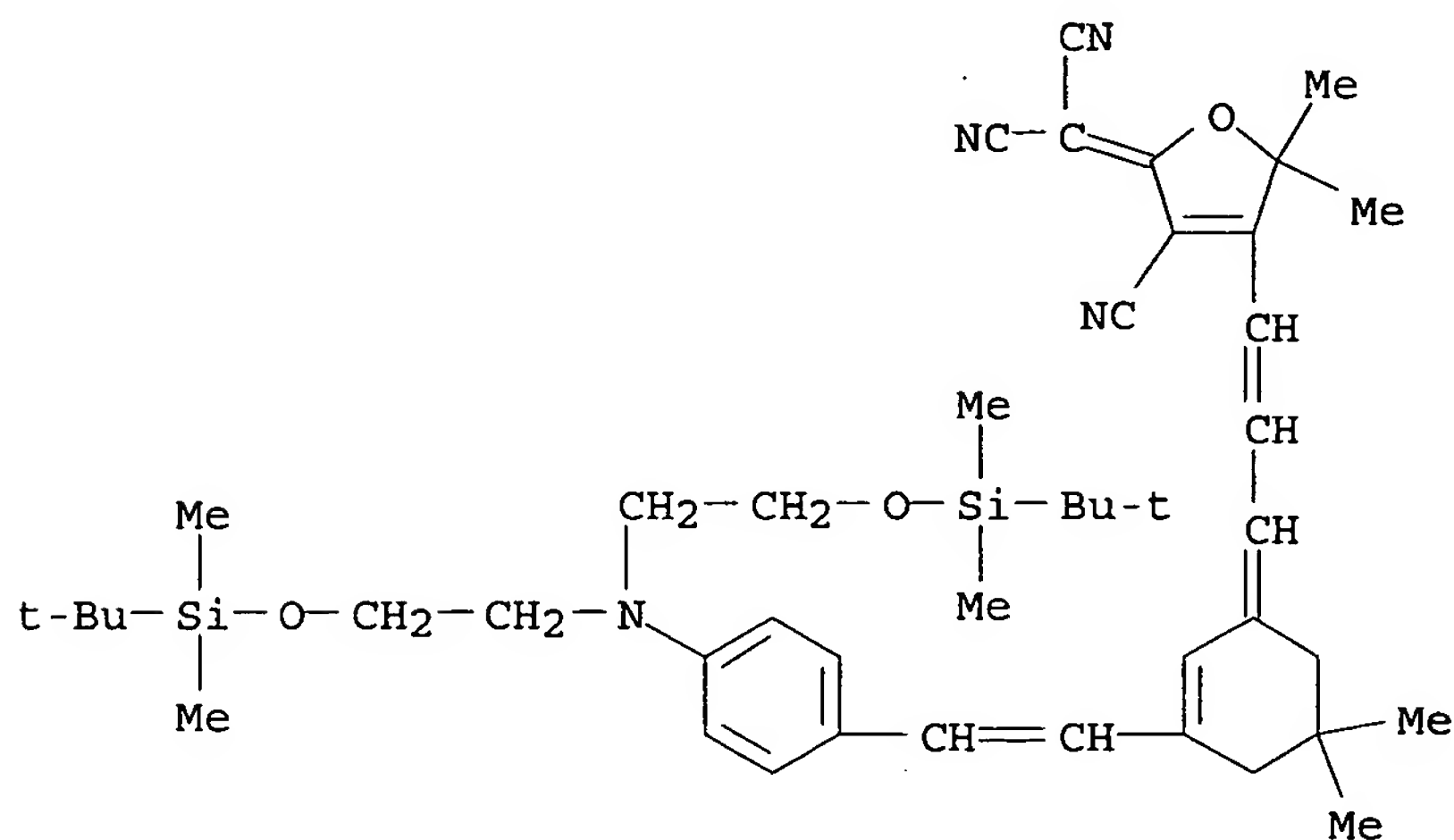
IT 266348-41-8

RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)

(electrooptic guest mol.; fabrication and replication of integrated optical devices by electron-beam lithog. and soft lithog.)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT: 40 THERE ARE 40 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 17 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:325411 HCAPLUS

DOCUMENT NUMBER: 141:71156

TITLE: Synthesis of New Electrooptic Chromophores and Their Structure-Property Relationship

AUTHOR(S): He, Mingqian; Leslie, Thomas; Garner, Sean; DeRosa, Michael; Cites, Jeffery

CORPORATE SOURCE: Corning Incorporated, Corning, NY, 14831, USA

SOURCE: Journal of Physical Chemistry B (2004), 108(25), 8731-8736

CODEN: JPCBFK; ISSN: 1520-6106

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

OTHER SOURCE(S): CASREACT 141:71156

AB Several new high  $\mu\beta$  chromophores have been synthesized. These chromophores were intentionally designed to study structure-property relationships. The synthetic strategy that was followed has been described in our previous publications. Chromophore photostability was investigated from a structural point of view. Contact and corona poling of the chromophores have also been accomplished with a 70 pm/V r33 being achieved at  $\lambda = 1550$  nm. The same chromophores were also studied in two different polymer host systems to compare their dependence of the electrooptic coefficient and stability on the matrix material.

IT 477741-14-3 477892-36-7

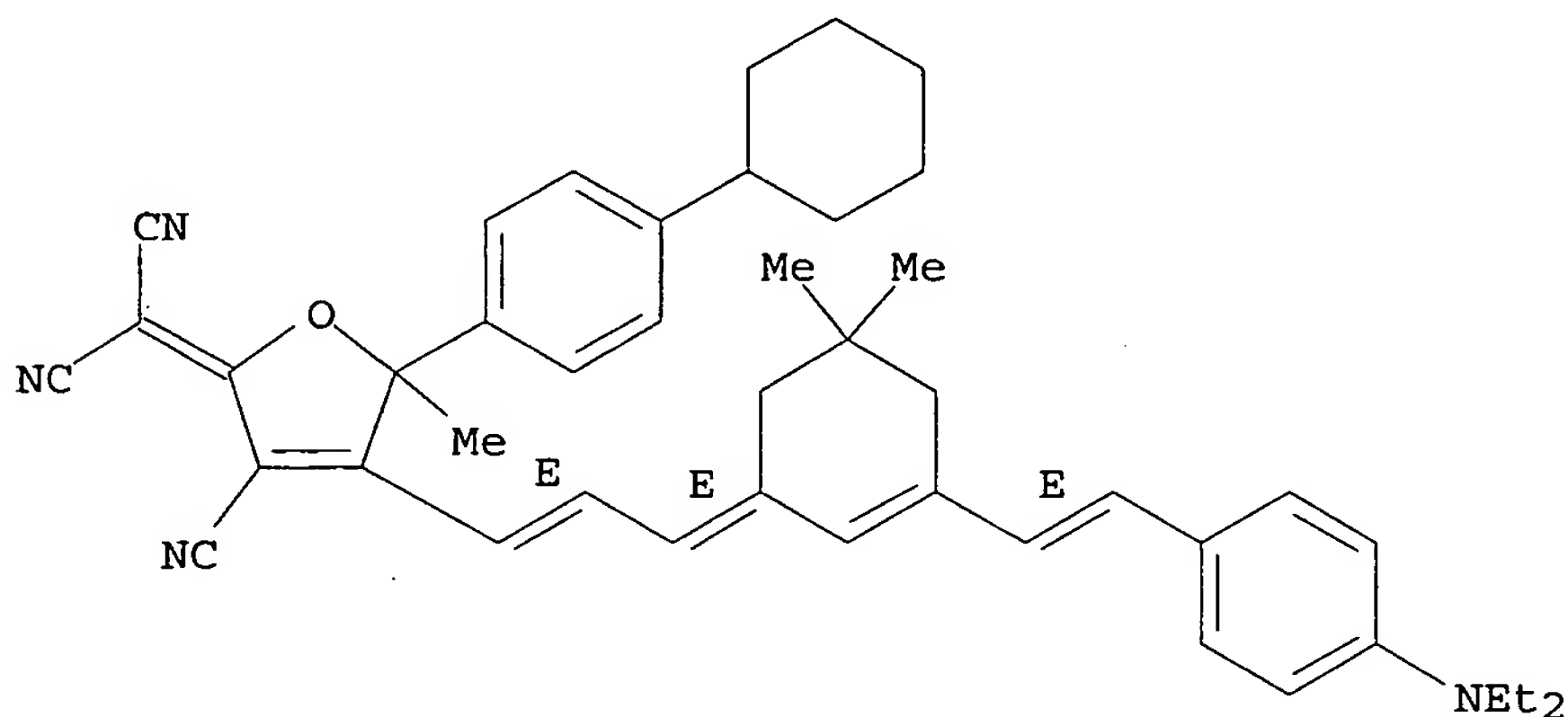
RL: PRP (Properties)

(preparation of electrooptic chromophores and structure-property relationship)

RN 477741-14-3 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

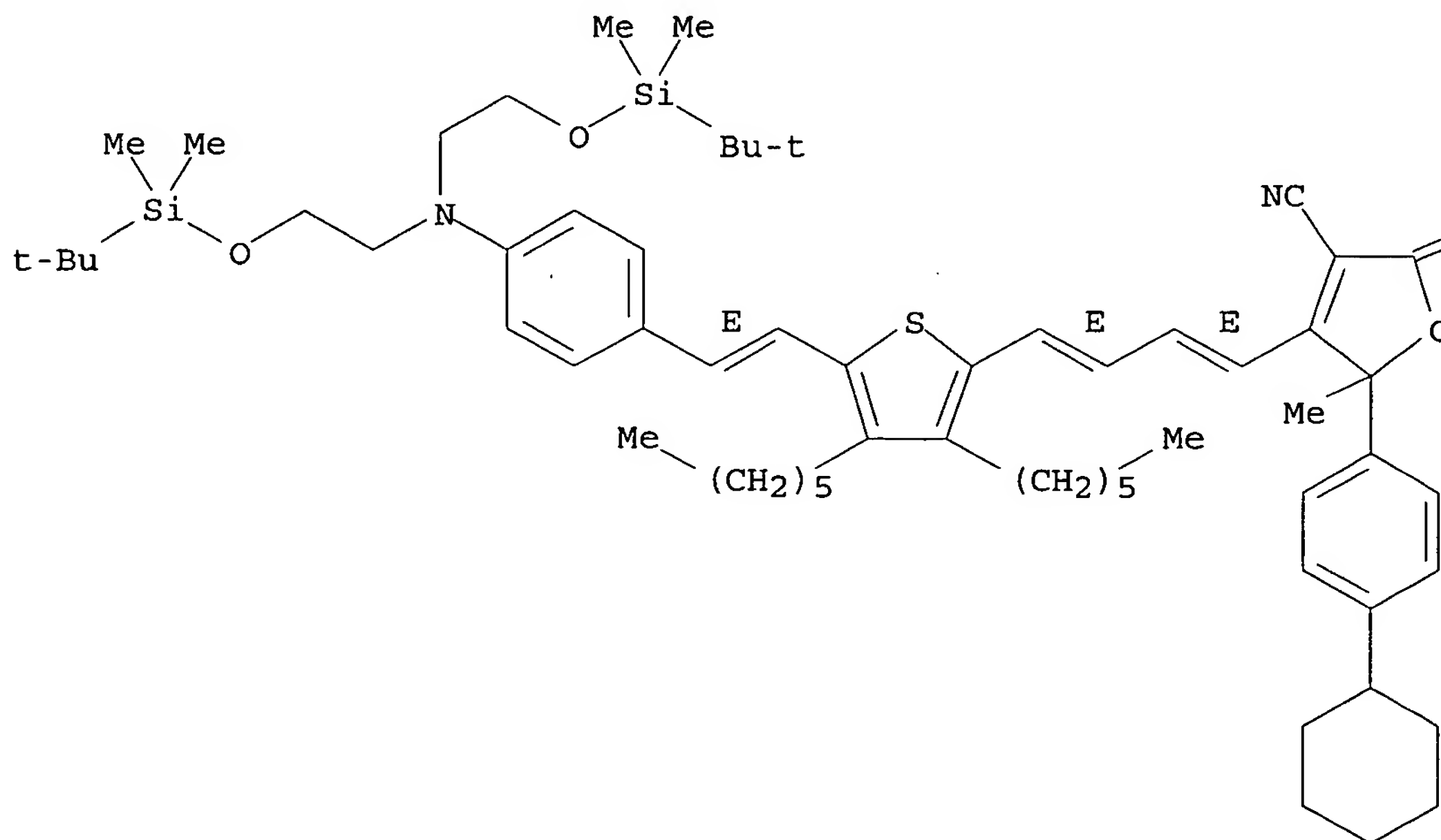


RN 477892-36-7 HCAPLUS

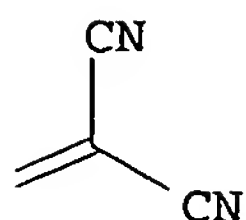
CN Propanedinitrile, [4-[(1E,3E)-4-[5-[(1E)-2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-3,4-dihexyl-2-thienyl]-1,3-butadienyl]-3-cyano-5-(4-cyclohexylphenyl)-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



IT 709656-40-6P 709656-41-7P 709656-44-0P

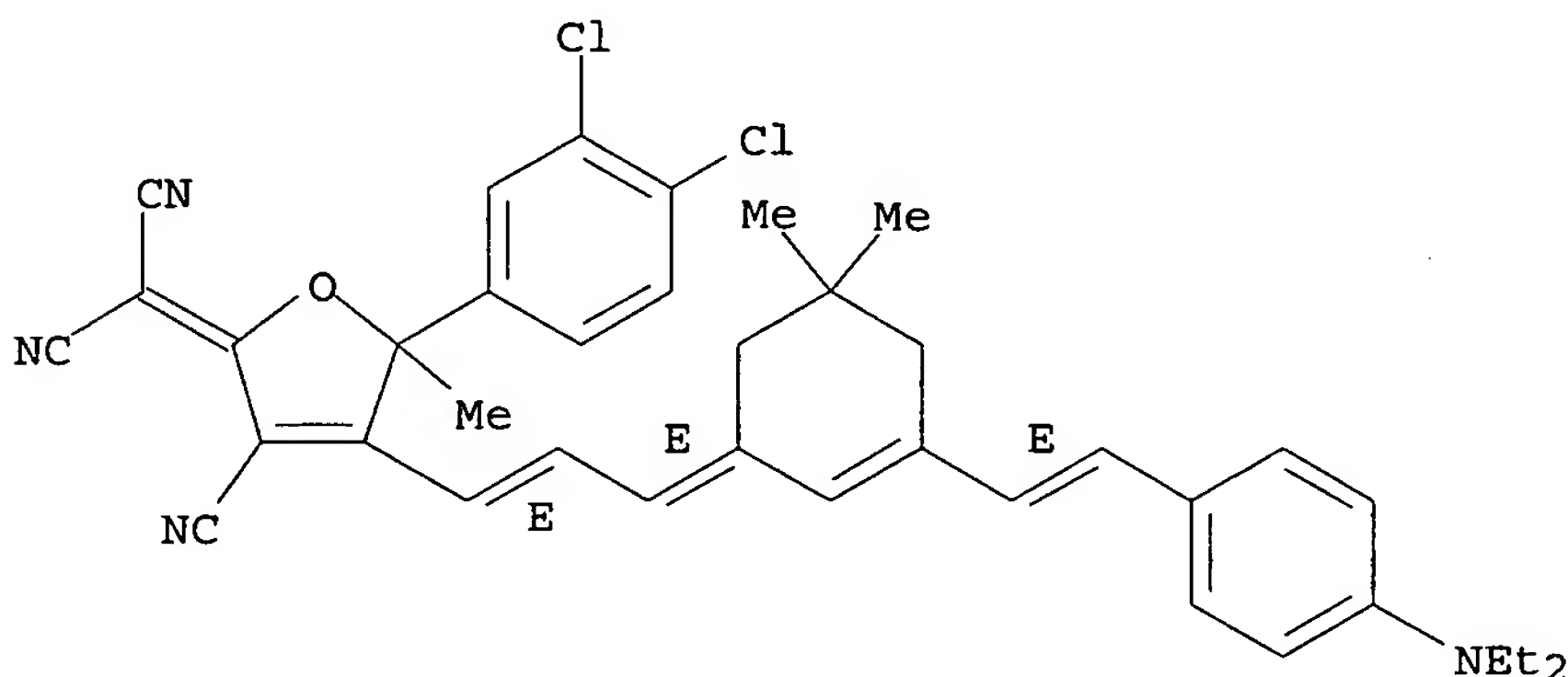
709656-45-1P 709656-47-3P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of electrooptic chromophores and structure-property  
 relationship)

RN 709656-40-6 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

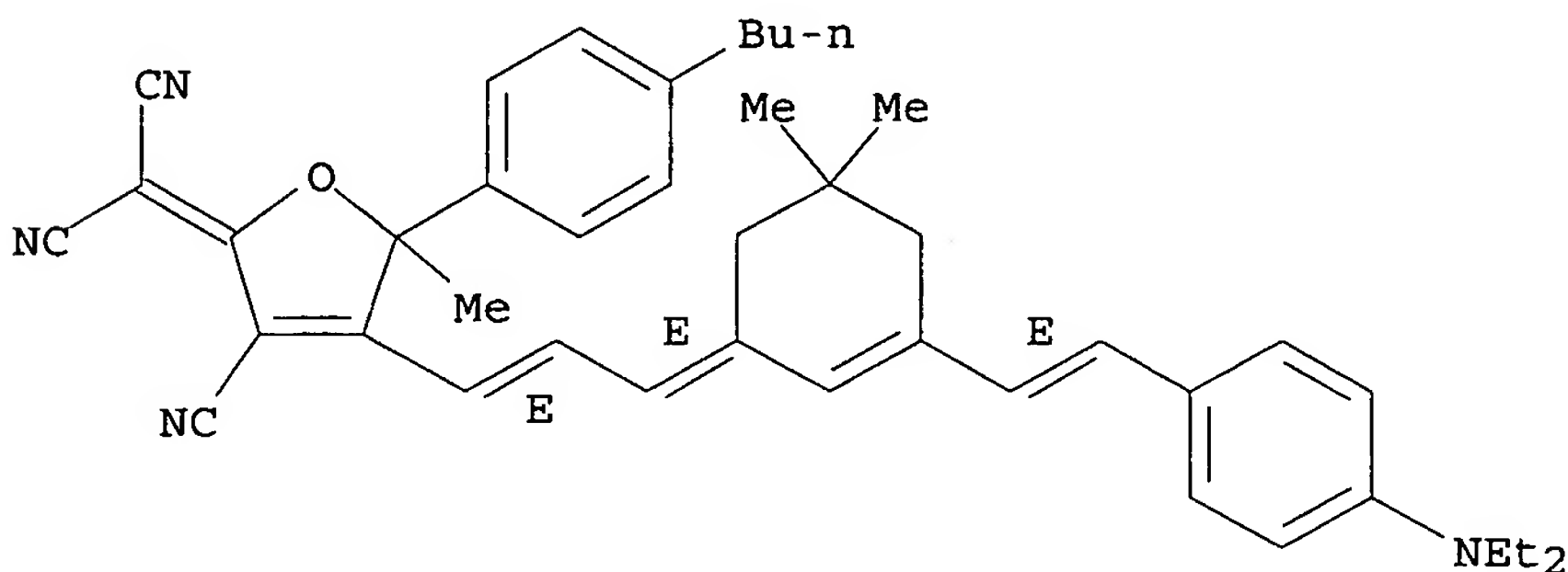
Double bond geometry as shown.



RN 709656-41-7 HCAPLUS

CN Propanedinitrile, [5-(4-butylphenyl)-3-cyano-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

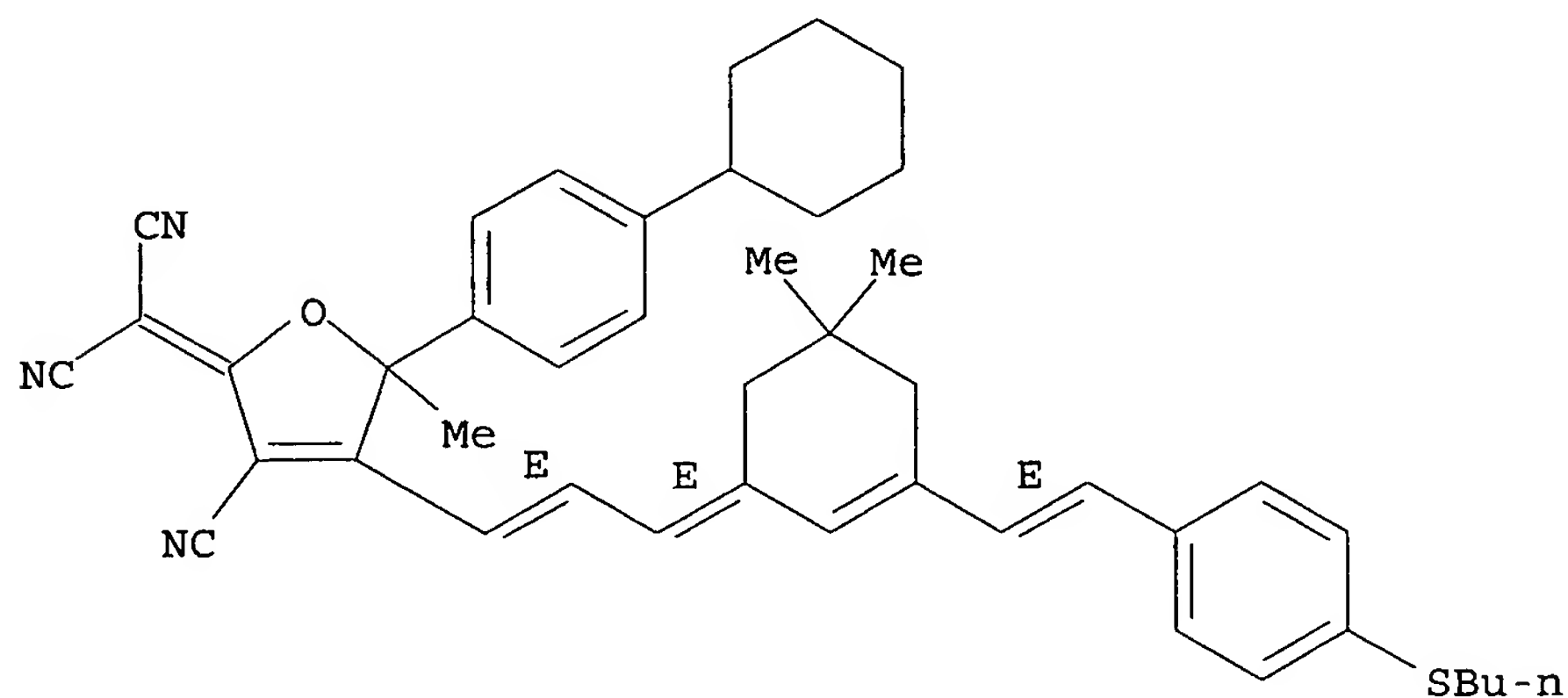
Double bond geometry as shown.



RN 709656-44-0 HCAPLUS

CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-(butylthio)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-(4-cyclohexylphenyl)-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

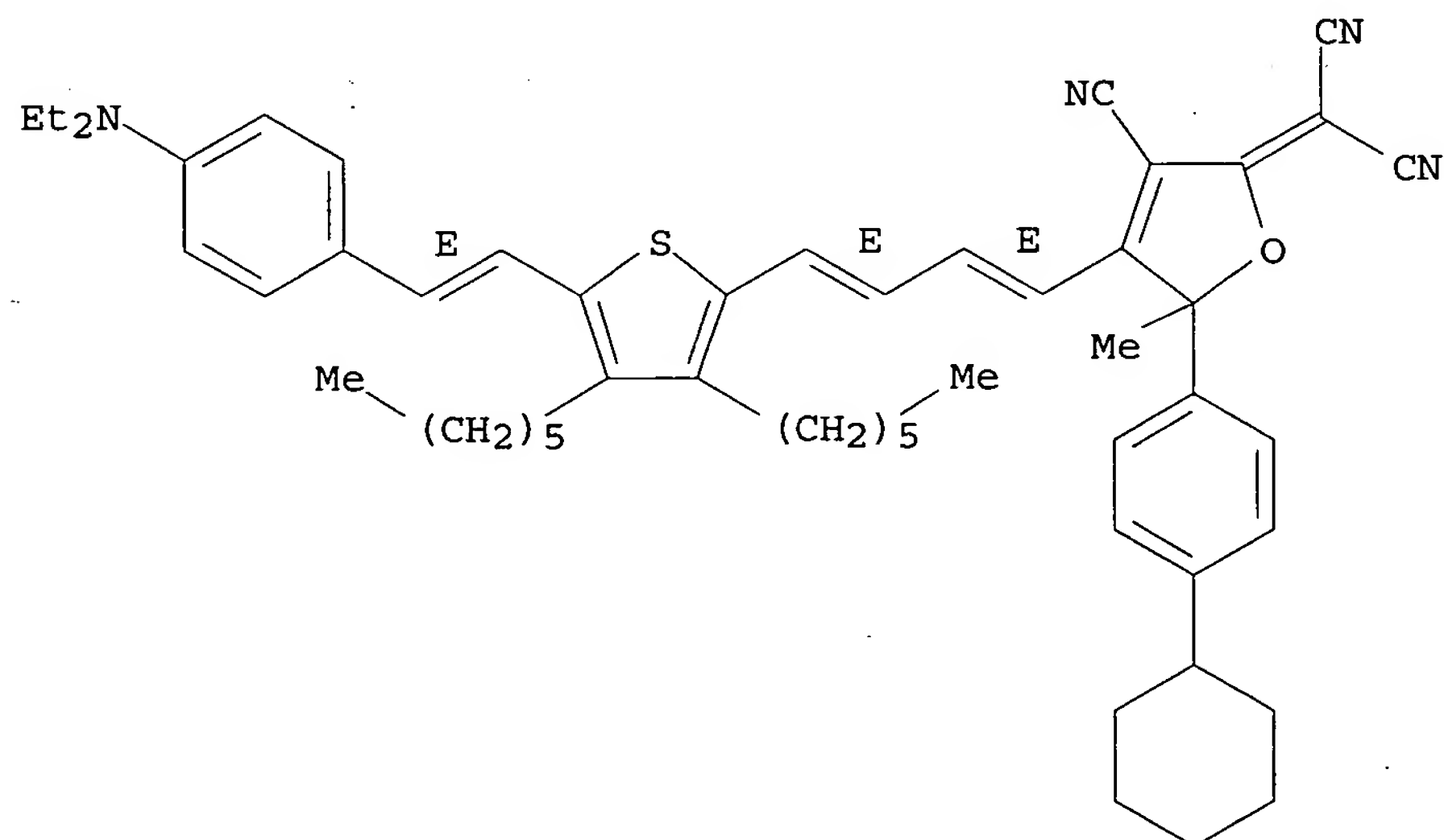
Double bond geometry as shown.



RN 709656-45-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[(1E,3E)-4-[5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-3,4-dihexyl-2-thienyl]-1,3-butadienyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

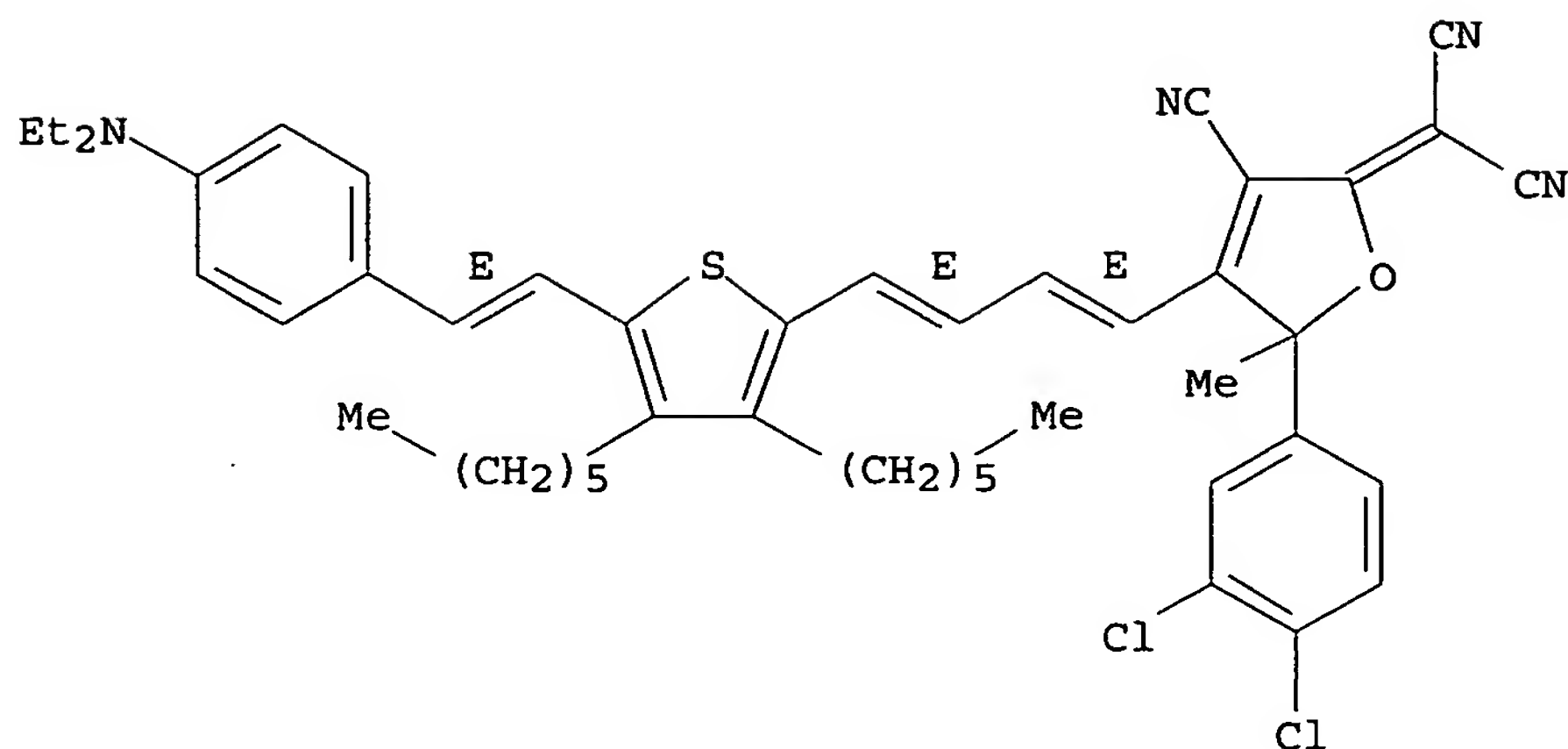
Double bond geometry as shown.



RN 709656-47-3 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4-[(1E,3E)-4-[5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-3,4-dihexyl-2-thienyl]-1,3-butadienyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



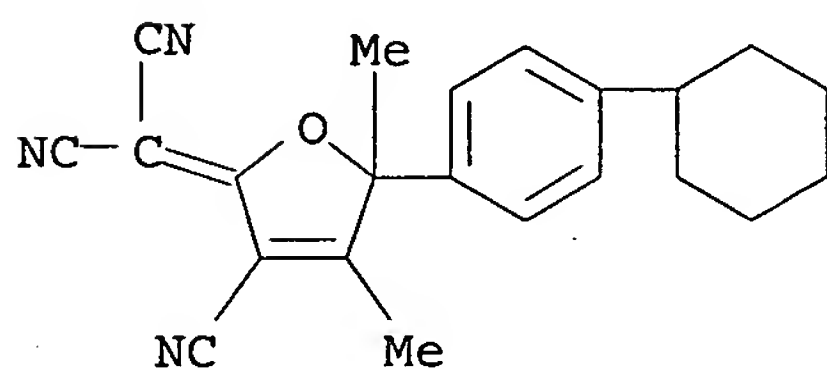
IT 383124-80-9 383124-82-1 383124-88-7

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of electrooptic chromophores and structure-property relationship)

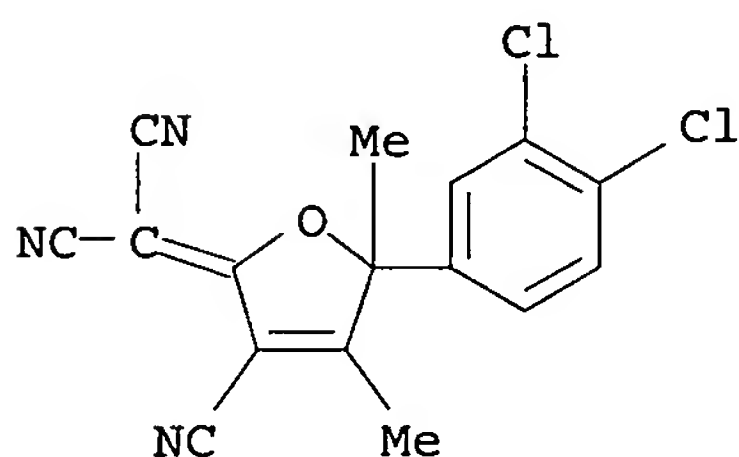
RN 383124-80-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



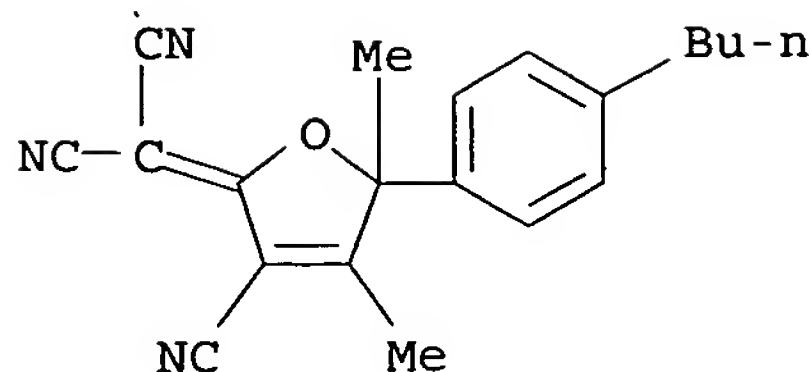
RN 383124-82-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



RN 383124-88-7 HCAPLUS

CN Propanedinitrile, [5-(4-butylphenyl)-3-cyano-4,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 18 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:321594 HCAPLUS

DOCUMENT NUMBER: 141:39718

TITLE: Experimental and Theoretical Investigations of Environmentally Sensitive Single-Molecule Fluorophores  
AUTHOR(S): Willets, Katherine A.; Callis, Patrik R.; Moerner, W. E.

CORPORATE SOURCE: Department of Chemistry, Stanford University, Stanford, CA, 94305, USA

SOURCE: Journal of Physical Chemistry B (2004), 108(29), 10465-10473

CODEN: JPCBFK; ISSN: 1520-6106

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The development of new fluorescent dyes for use in single-mol. imaging is an important challenge due to the numerous problems in biomol. and materials science that can benefit from measurements at the level of individual mols. A new class of fluorophores has been described recently that is not only well suited for single-mol. imaging but also shows strong sensitivity to the local environment. These mols., known as the DCDHFs, contain an amine donor and a dicyanodihydrofuran acceptor linked by a conjugated unit (benzene, thiophene, styrene). The environmental sensitivity of these dyes can be characterized through bulk spectroscopic and fluorescence measurements as a function of solvent and solvent viscosity. Excited state lifetime data for single DCDHF mols. in polymers also demonstrate the value of the DCDHFs as probes of their local environment. To further understand the behavior, a series of electronic structure calcns. have been completed, which yield insight into how certain twists within the DCDHF mol. may affect radiative and nonradiative processes. These insights will help direct synthetic modifications in the mol. structure to improve the environmental sensitivity and fluorescence quantum yield of these single-mol. probes.

IT 402490-54-4, DCDHF 6

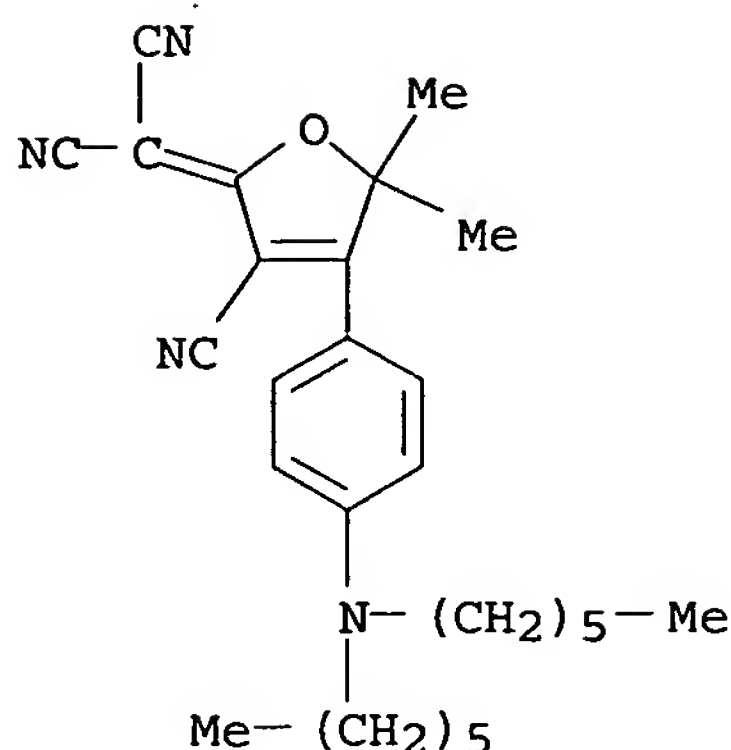
RL: PRP (Properties)

(exptl. and theor. investigations of environmentally sensitive single-mol. fluorophores)

RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

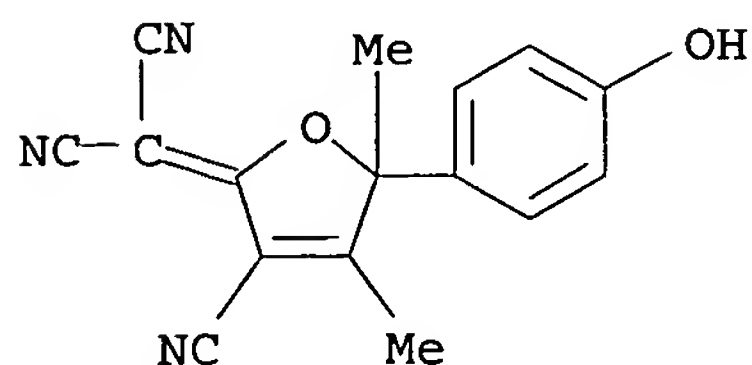




REFERENCE COUNT: 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 19 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2004:283941 HCAPLUS  
 DOCUMENT NUMBER: 141:72955  
 TITLE: Synthesis and linear/nonlinear optical properties of a new class of 'RHS' NLO chromophore  
 AUTHOR(S): Kay, Andrew J.; Woolhouse, Anthony D.; Zhao, Yuxia; Clays, Koen  
 CORPORATE SOURCE: Opto-Organics Group, Industrial Research Limited, P.O.Box 31 310, Lower Hutt, N. Z.  
 SOURCE: Journal of Materials Chemistry (2004), 14(8), 1321-1330  
 CODEN: JMACEP; ISSN: 0959-9428  
 PUBLISHER: Royal Society of Chemistry  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 OTHER SOURCE(S): CASREACT 141:72955  
 AB Examples of a new class of zwitterionic, "right-hand side" (RHS) merocyanines containing a cyanodicyanomethylidenedihydrofuran electron acceptor were prepared. As well as allowing for the facile synthesis of these chromophores, the synthetic methodology enables considerable variation in both the donor moiety as well as the extent of conjugation between the donor and acceptor systems. As expected, all of these RHS systems are neg. solvatochromic, with the difference between  $\lambda_{max}$  (polar vs. nonpolar solvents) increasing with the extent of conjugation. In accord with expectations, hyper-Raleigh scattering (HRS) measurements confirm that mols. with the greatest conjugation pathway have the largest first hyperpolarizabilities,  $\beta_0$ . In addition, the HRS evaluation indicates that the 4-quinolinylidene donor nucleus is superior to both the 4-pyridinylidene and benzothiazolylidene systems. The figures of merit,  $\mu(\text{calc}) \cdot \beta_0(\text{measured})$ , that are obtained for some of these compds., are of a similar magnitude to the best "left hand side" examples reported in the literature. To demonstrate the versatility of the synthetic technique, representative polymer-tetherable derivs. of these compds. were prepared, as have the corresponding TDI-based polyurethanes.  
 IT 712273-61-5P 712273-63-7P 712273-64-8P  
 712273-65-9P 712273-66-0P 712273-67-1P  
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (intermediate; synthesis and linear/nonlinear optical properties of new class of right-hand-side NLO chromophore)  
 RN 712273-61-5 HCAPLUS

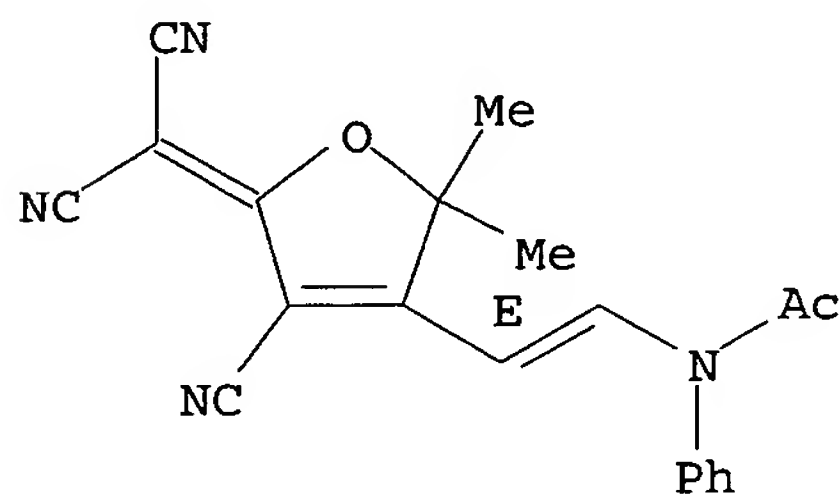
CN Propanedinitrile, [3-cyano-5-(4-hydroxyphenyl)-4,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 712273-63-7 HCAPLUS

CN Acetamide, N-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-N-phenyl- (9CI) (CA INDEX NAME)

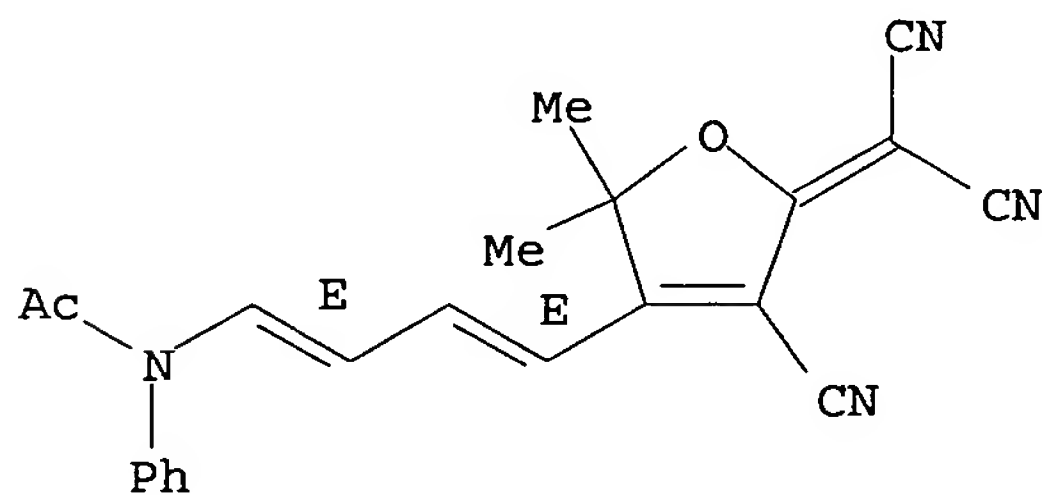
Double bond geometry as shown.



RN 712273-64-8 HCAPLUS

CN Acetamide, N-[(1E,3E)-4-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]-1,3-butadienyl]-N-phenyl- (9CI) (CA INDEX NAME)

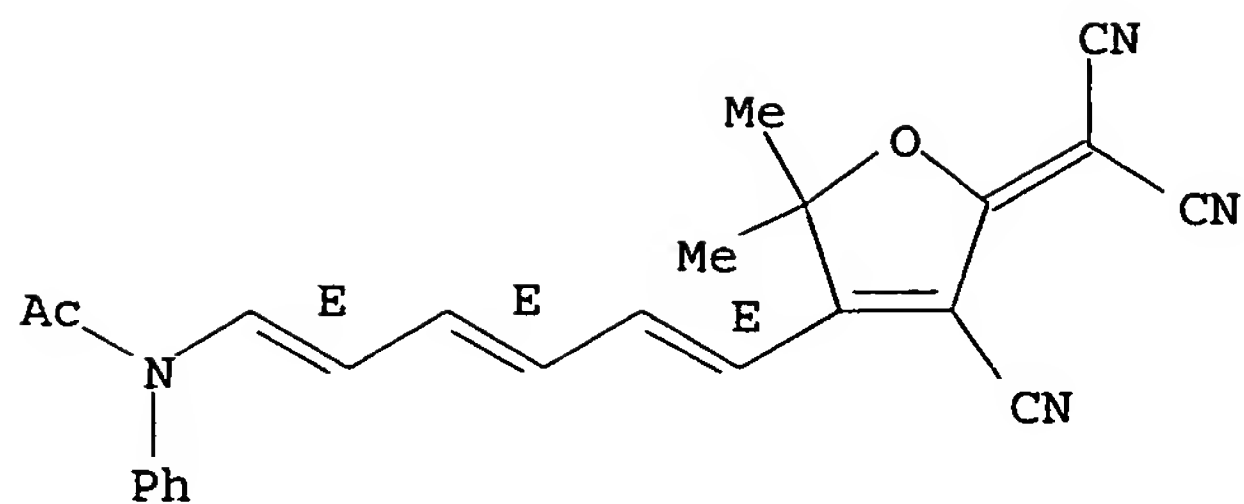
Double bond geometry as shown.



RN 712273-65-9 HCAPLUS

CN Acetamide, N-[(1E,3E,5E)-6-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]-1,3,5-hexatrienyl]-N-phenyl- (9CI) (CA INDEX NAME)

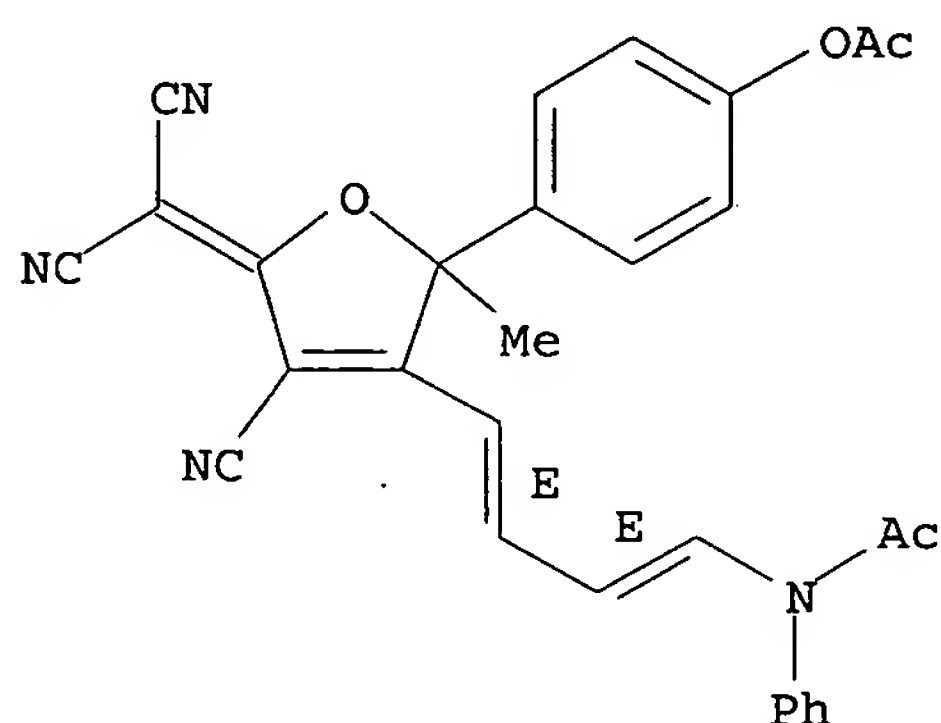
Double bond geometry as shown.



RN 712273-66-0 HCAPLUS

CN Acetamide, N-[(1E,3E)-4-[2-[4-(acetyloxy)phenyl]-4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-methyl-3-furanyl]-1,3-butadienyl]-N-phenyl- (9CI) (CA INDEX NAME)

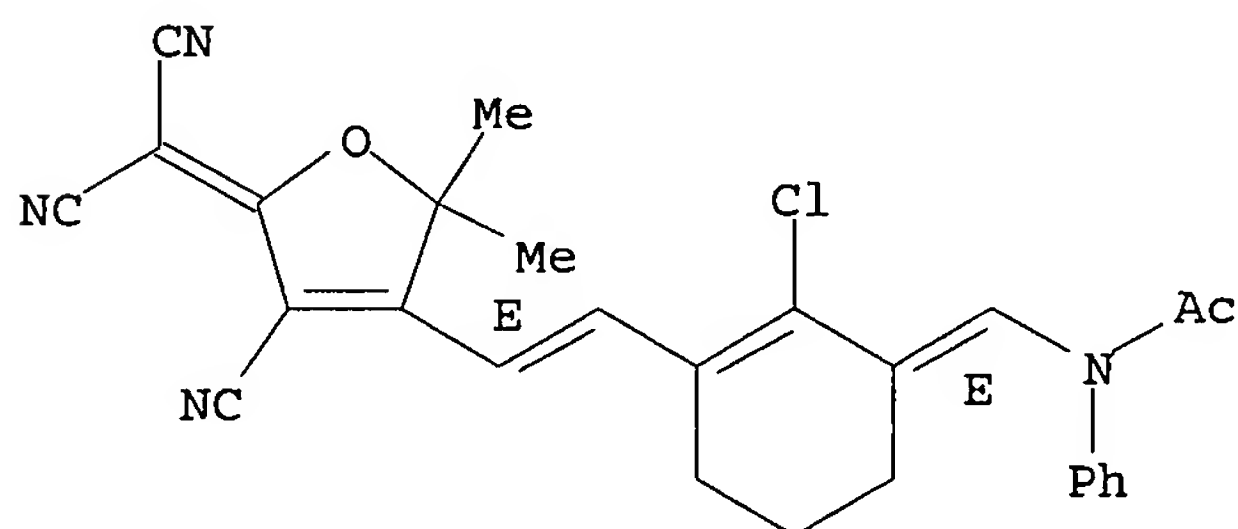
Double bond geometry as shown.



RN 712273-67-1 HCAPLUS

CN Acetamide, N-[(E)-[2-chloro-3-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-cyclohexen-1-ylidene]methyl]-N-phenyl- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

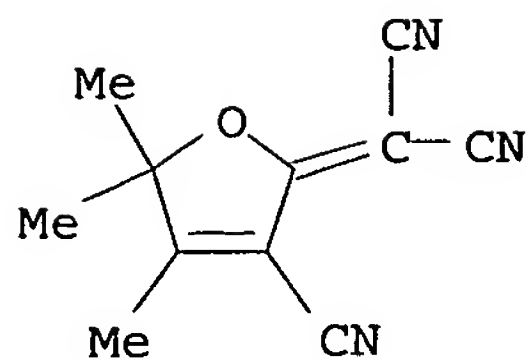


IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)  
(starting material; synthesis and linear/nonlinear optical properties  
of new class of right-hand-side NLO chromophore)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA INDEX NAME)



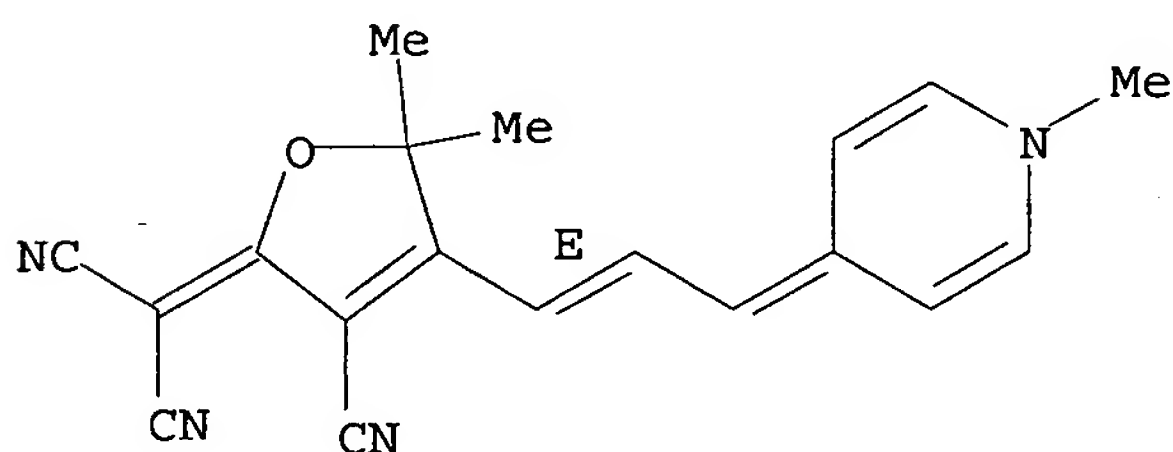
IT 712273-71-7P 712273-72-8P 712273-73-9P  
 712273-74-0P 712273-75-1P 712273-76-2P  
 712273-77-3P 712273-78-4P 712273-79-5P  
 712273-80-8P 712273-81-9P 712273-82-0P  
 712273-83-1P 712273-84-2P 712273-85-3P  
 712273-86-4P 712273-87-5P 712273-88-6P  
 712273-89-7P 712273-91-1P 712273-93-3P  
 712273-94-4P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (synthesis and linear/nonlinear optical properties of new class of  
 right-hand-side NLO chromophore)

RN 712273-71-7 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(1E)-3-(1-methyl-4(1H)-  
 pyridinylidene)-1-propenyl]-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)

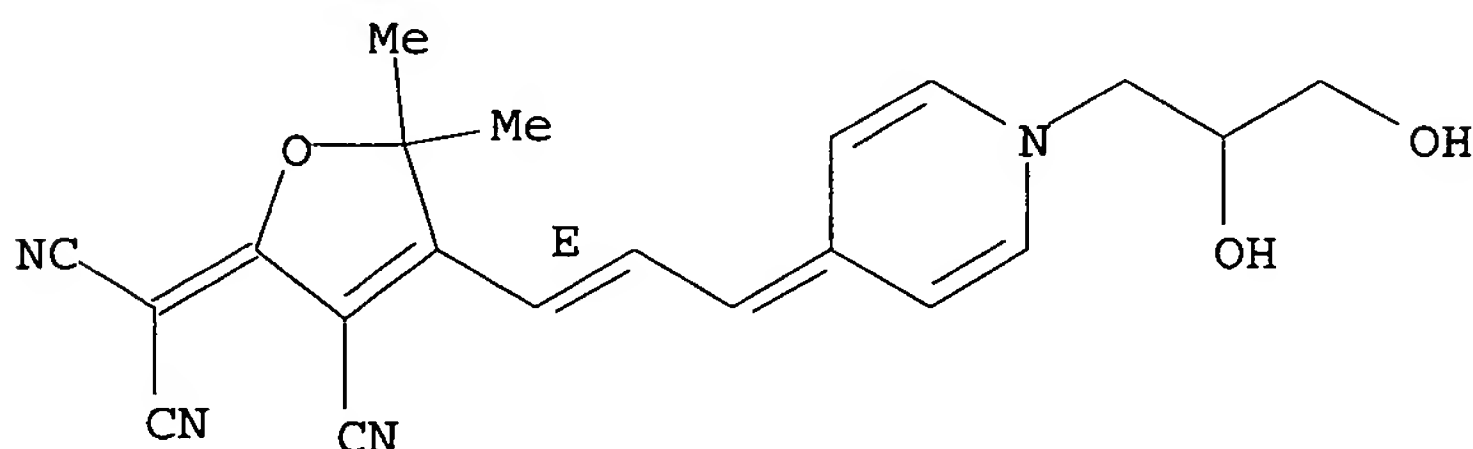
Double bond geometry as shown.



RN 712273-72-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-3-[1-(2,3-dihydroxypropyl)-4(1H)-  
 pyridinylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanlylidene]- (9CI) (CA  
 INDEX NAME)

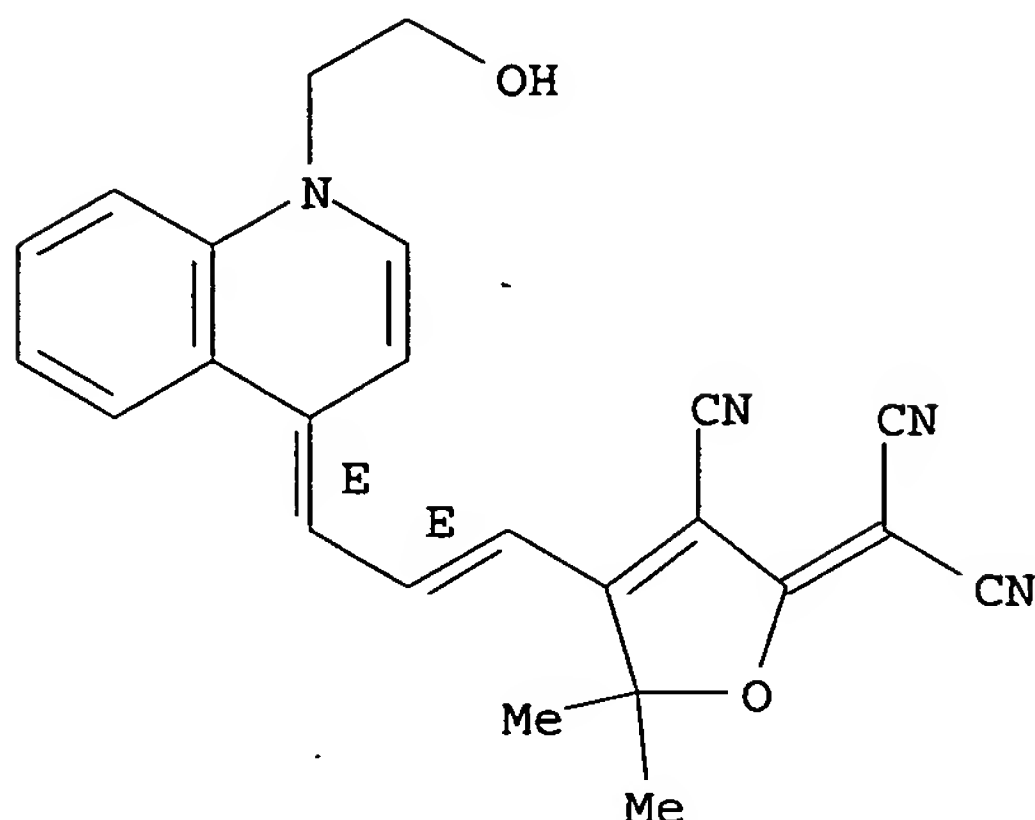
Double bond geometry as shown.



RN 712273-73-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E,3E)-3-[1-(2-hydroxyethyl)-4(1H)-  
 quinolinylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanlylidene]- (9CI) (CA  
 INDEX NAME)

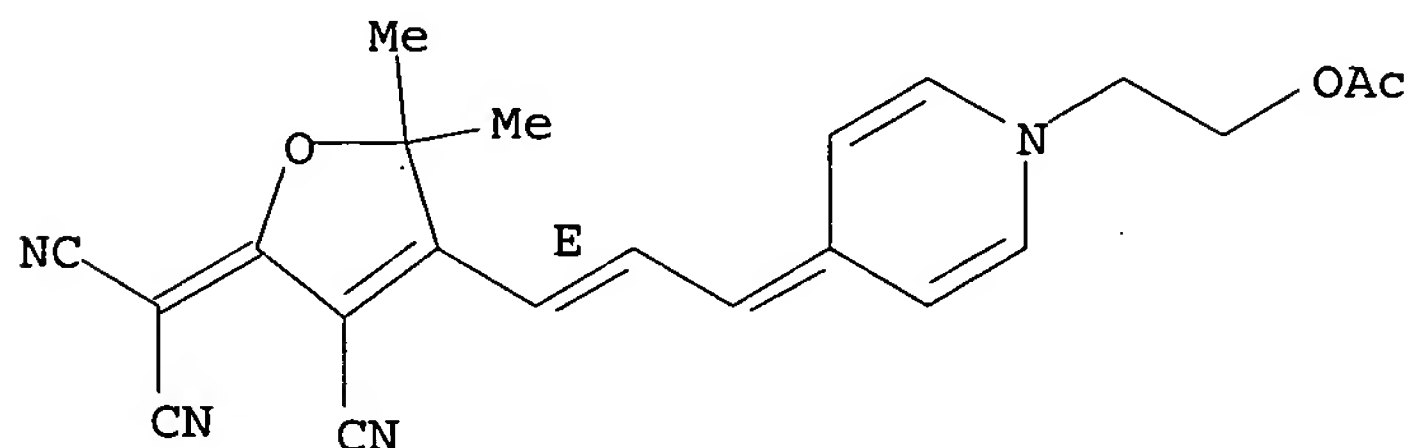
Double bond geometry as shown.



RN 712273-74-0 HCAPLUS

CN Propanedinitrile, [4-[(1E)-3-[1-[2-(acetyloxy)ethyl]-4(1H)-pyridinylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

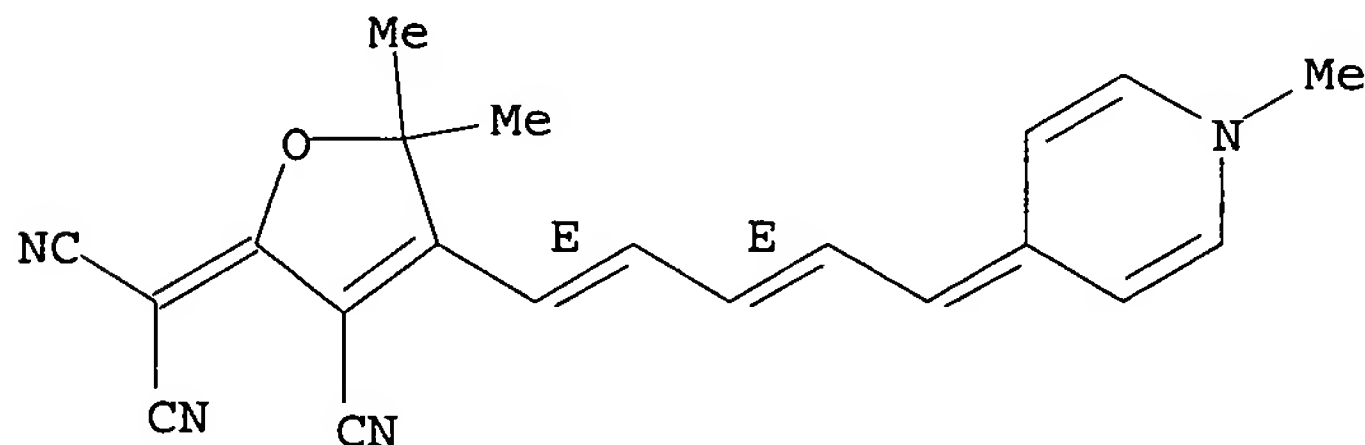
Double bond geometry as shown.



RN 712273-75-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(1E,3E)-5-(1-methyl-4(1H)-pyridinylidene)-1,3-pentadienyl]-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

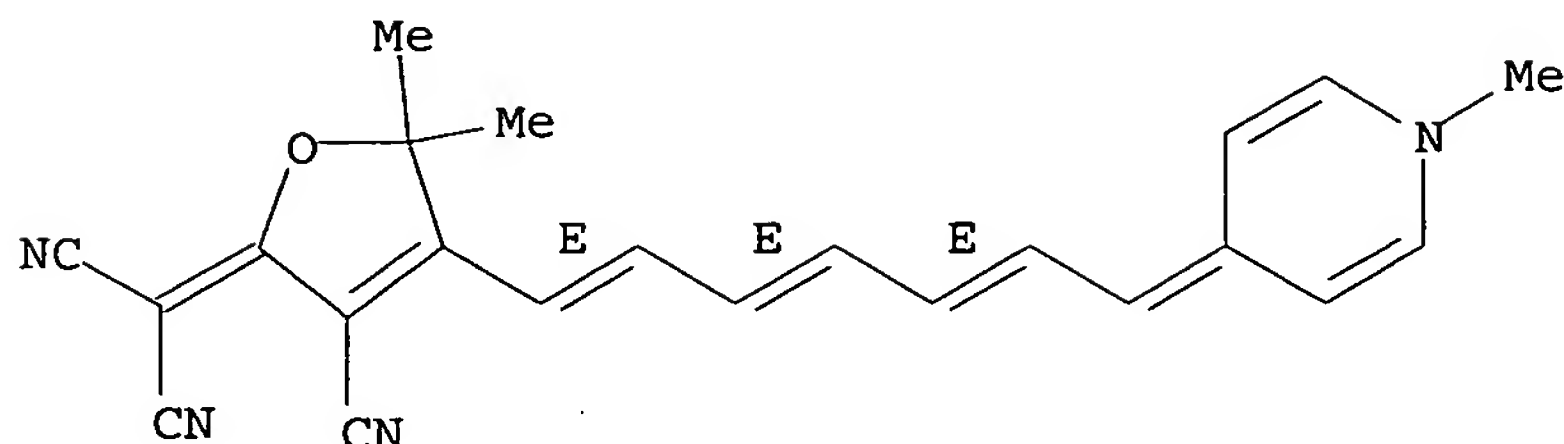
Double bond geometry as shown.



RN 712273-76-2 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(1E,3E,5E)-7-(1-methyl-4(1H)-pyridinylidene)-1,3,5-heptatrienyl]-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

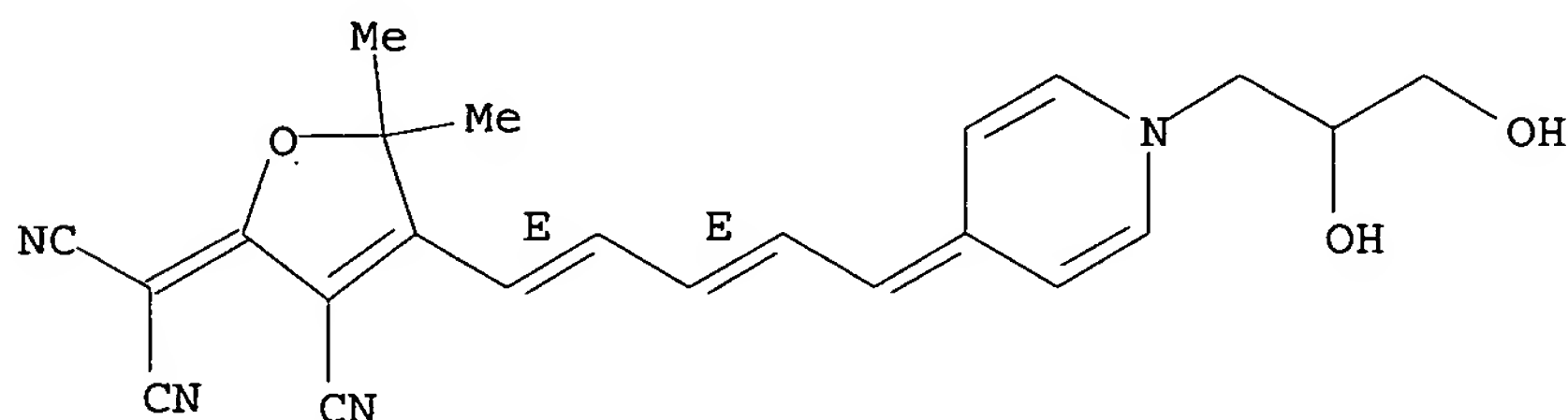
Double bond geometry as shown.



RN 712273-77-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E,3E)-5-[1-(2,3-dihydroxypropyl)-4(1H)-pyridinylidene]-1,3-pentadienyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI)  
(CA INDEX NAME)

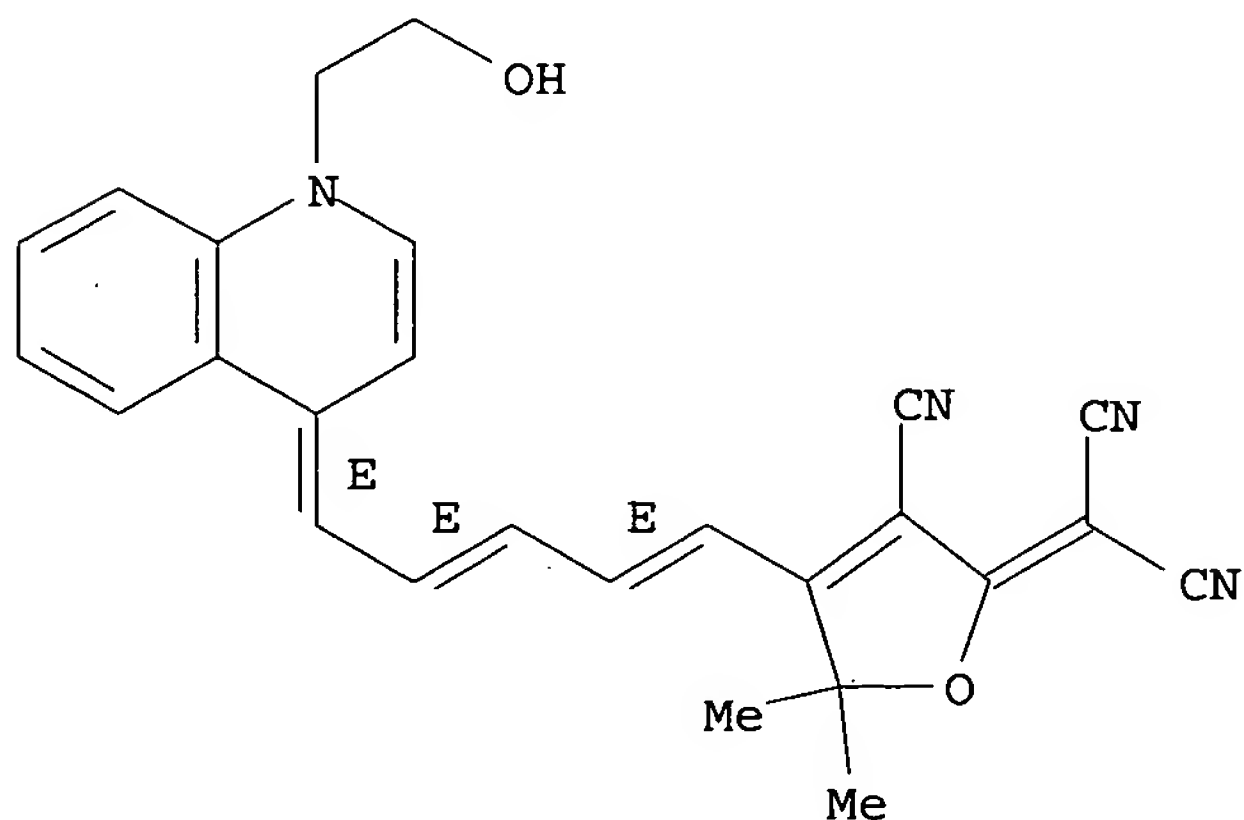
Double bond geometry as shown.



RN 712273-78-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E,3E,5E)-5-[1-(2-hydroxyethyl)-4(1H)-quinolinylidene]-1,3-pentadienyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI)  
(CA INDEX NAME)

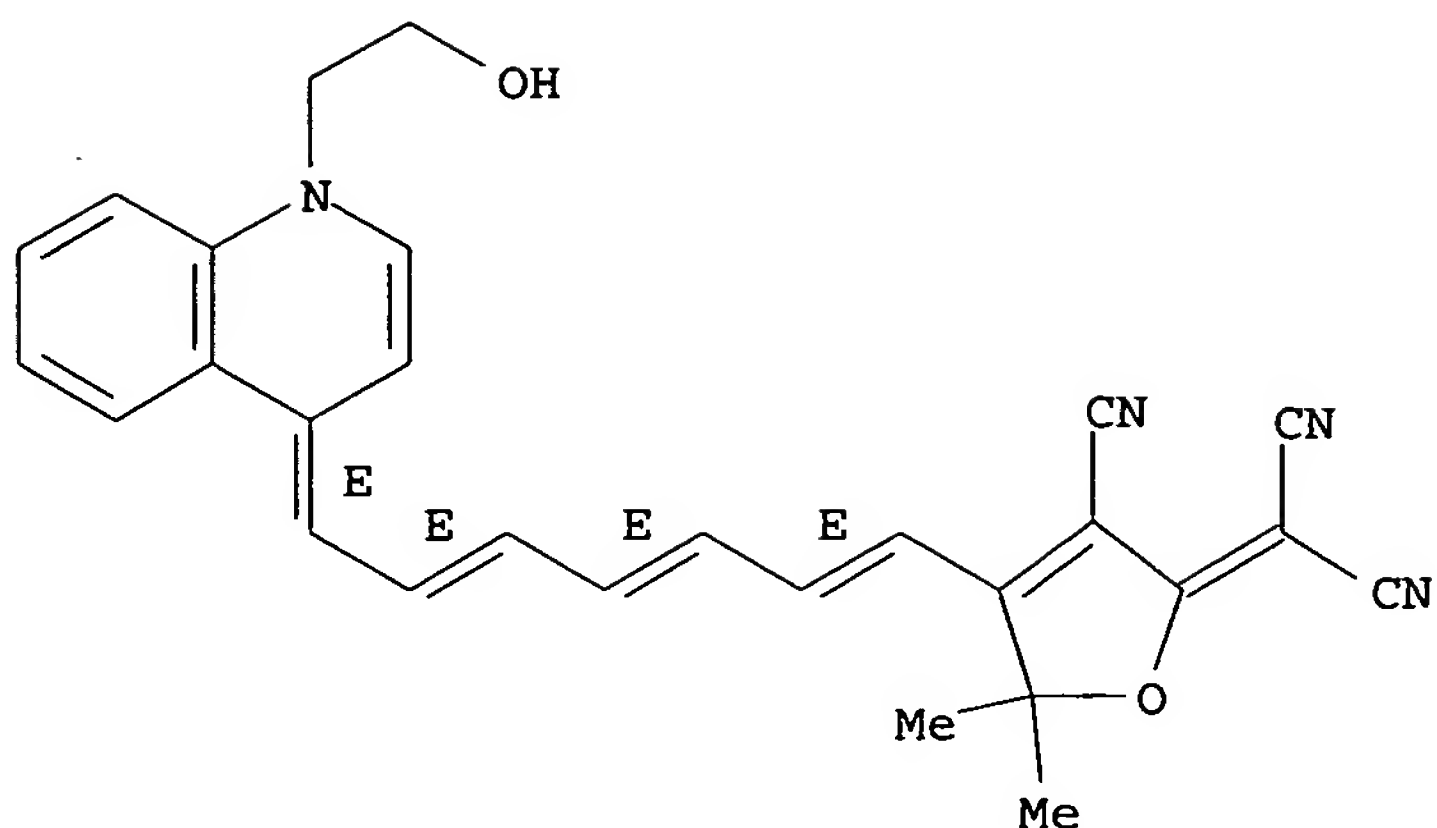
Double bond geometry as shown.



RN 712273-79-5 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E,3E,5E,7E)-7-[1-(2-hydroxyethyl)-4(1H)-quinolinylidene]-1,3,5-heptatrienyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

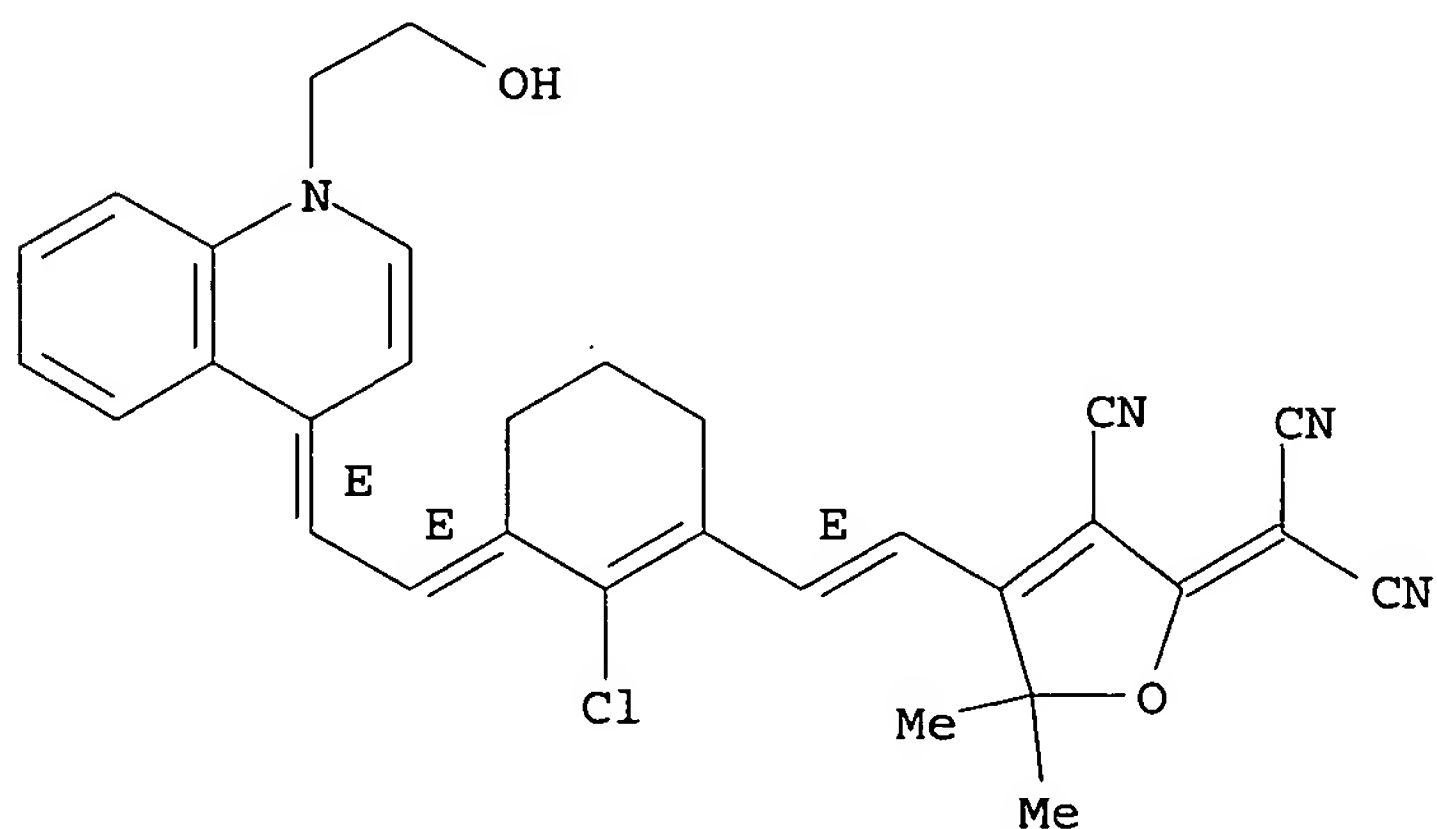
Double bond geometry as shown.



RN 712273-80-8 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[(3E)-2-chloro-3-[(2E)-[1-(2-hydroxyethyl)-4(1H)-quinolinylidene]ethylidene]-1-cyclohexen-1-yl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furylidenel]- (9CI) (CA INDEX NAME)

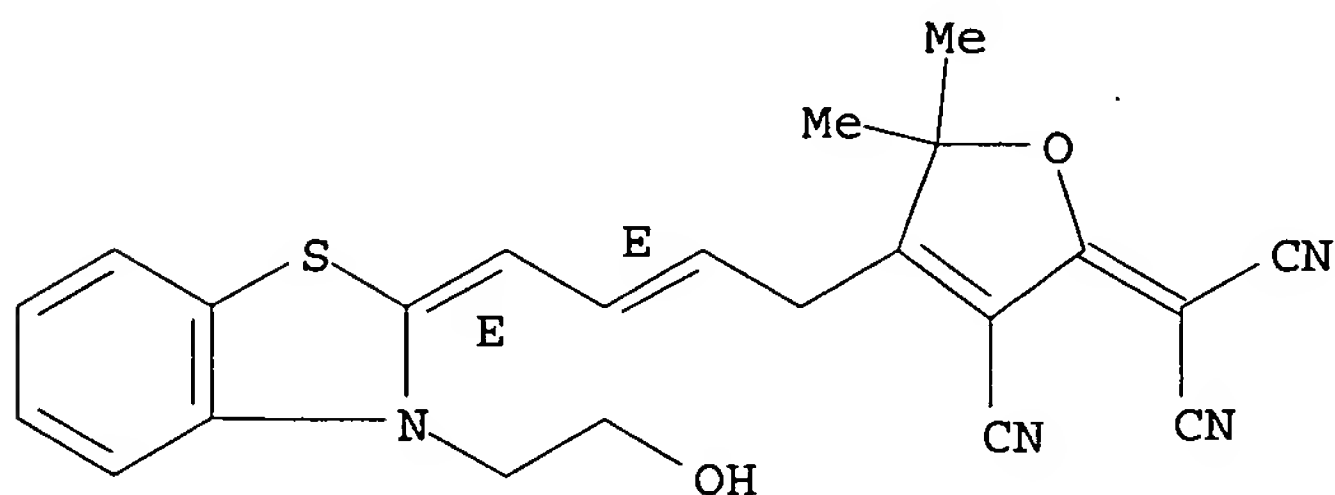
Double bond geometry as shown.



RN 712273-81-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E,4E)-4-[3-(2-hydroxyethyl)-2(3H)-benzothiazolylidene]-2-butenyl]-5,5-dimethyl-2(5H)-furylidenel]- (9CI) (CA INDEX NAME)

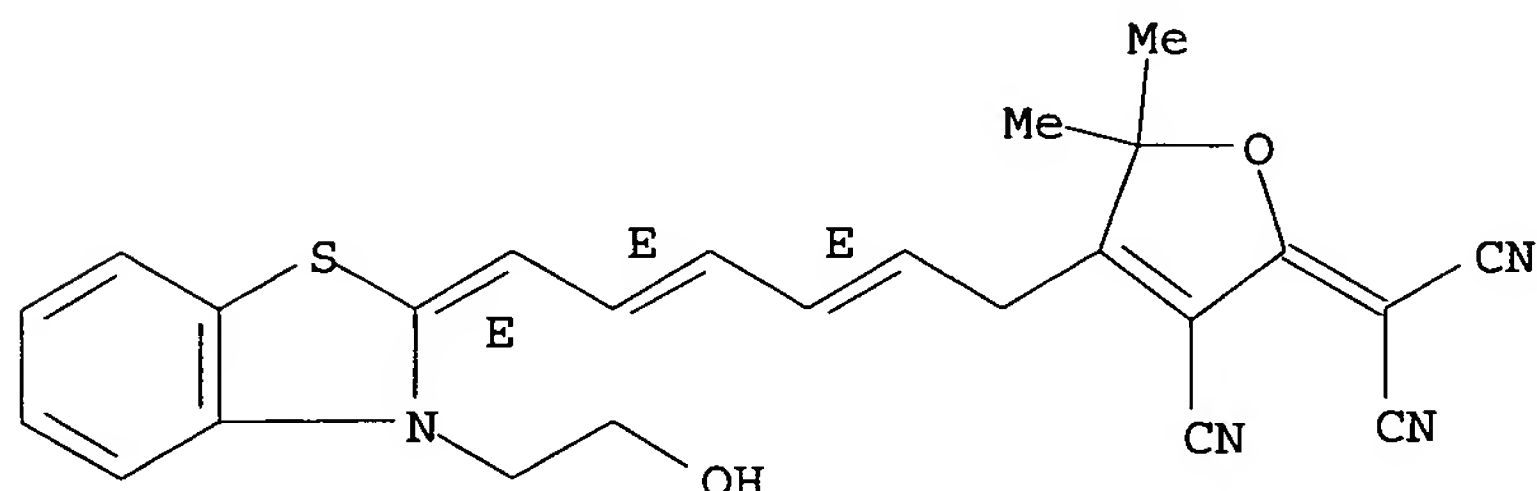
Double bond geometry as shown.



RN 712273-82-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E,4E,6E)-6-[3-(2-hydroxyethyl)-2(3H)-benzothiazolylidene]-2,4-hexadienyl]-5,5-dimethyl-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)

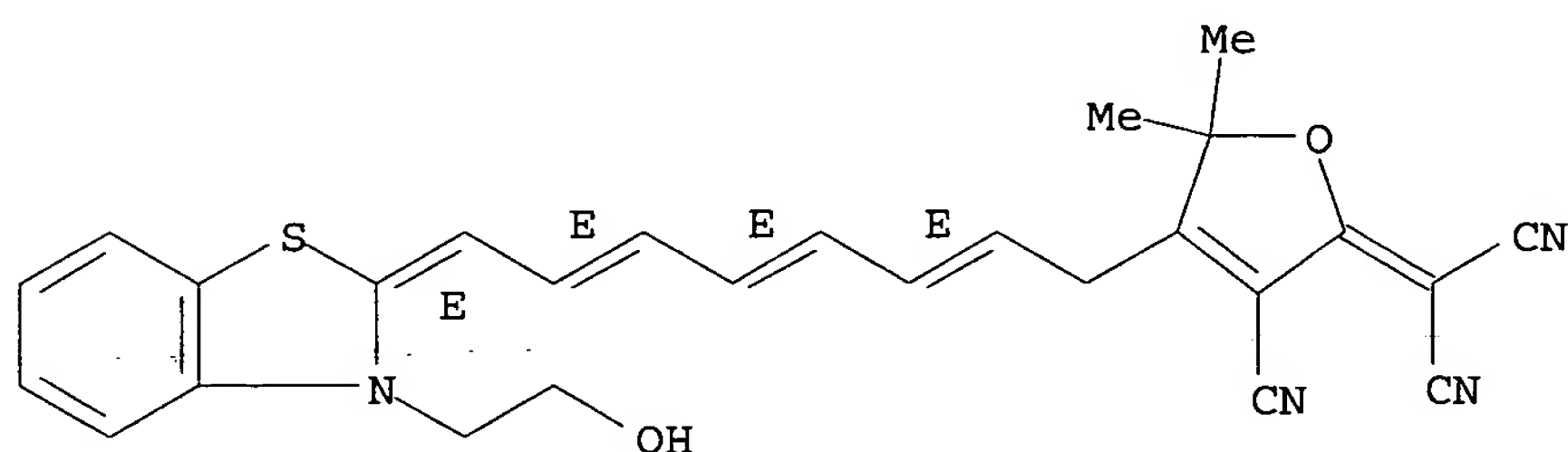
Double bond geometry as shown.



RN 712273-83-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E,4E,6E,8E)-8-[3-(2-hydroxyethyl)-2(3H)-benzothiazolylidene]-2,4,6-octatrienyl]-5,5-dimethyl-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)

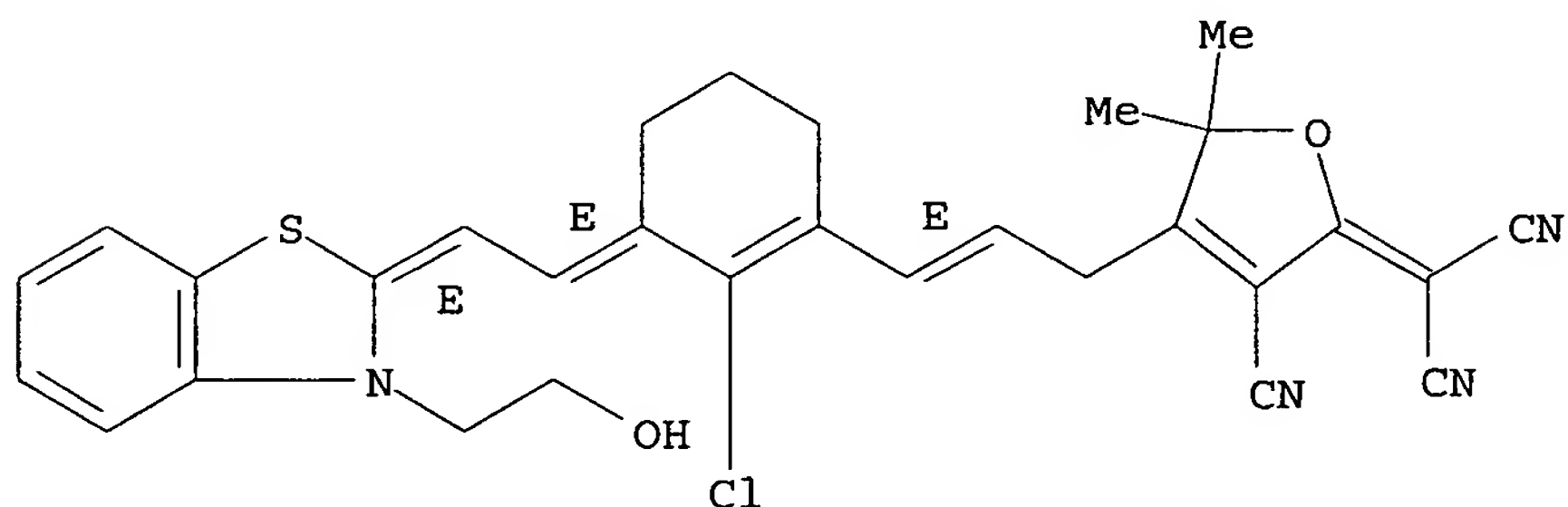
Double bond geometry as shown.



RN 712273-84-2 HCAPLUS

CN Propanedinitrile, [4-[(2E)-3-[(3E)-2-chloro-3-[(2E)-[3-(2-hydroxyethyl)-2(3H)-benzothiazolylidene]ethylidene]-1-cyclohexen-1-yl]-2-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.

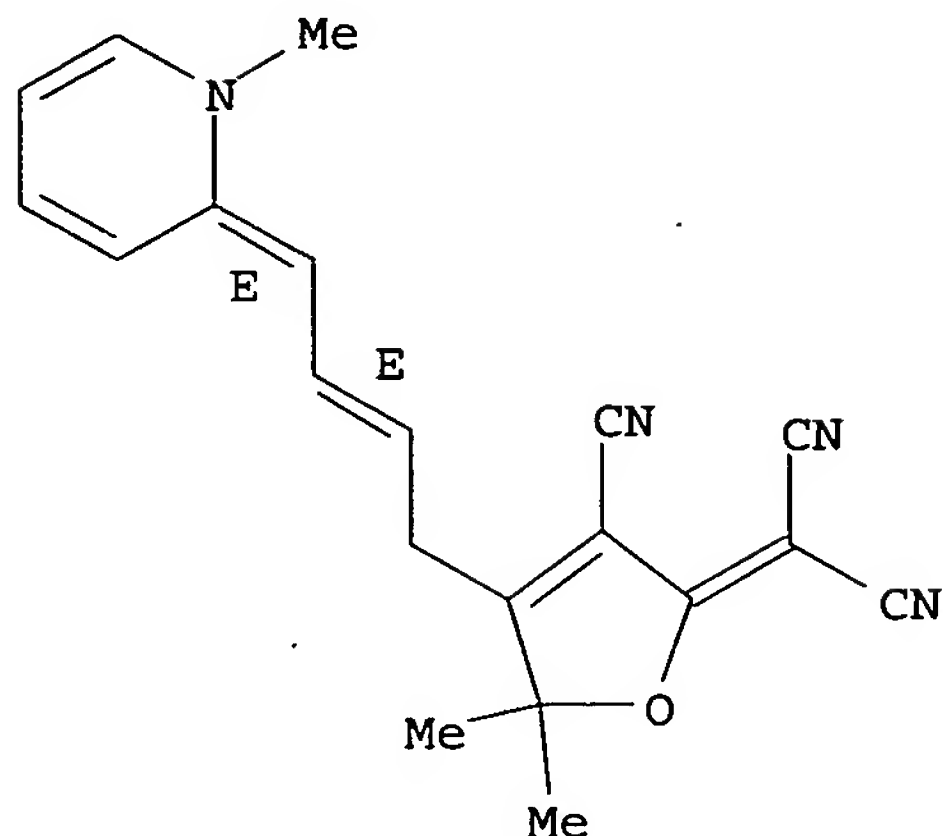


RN 712273-85-3 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(2E,4E)-4-(1-methyl-2(1H)-pyridinylidene)-2-butenyl]-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)



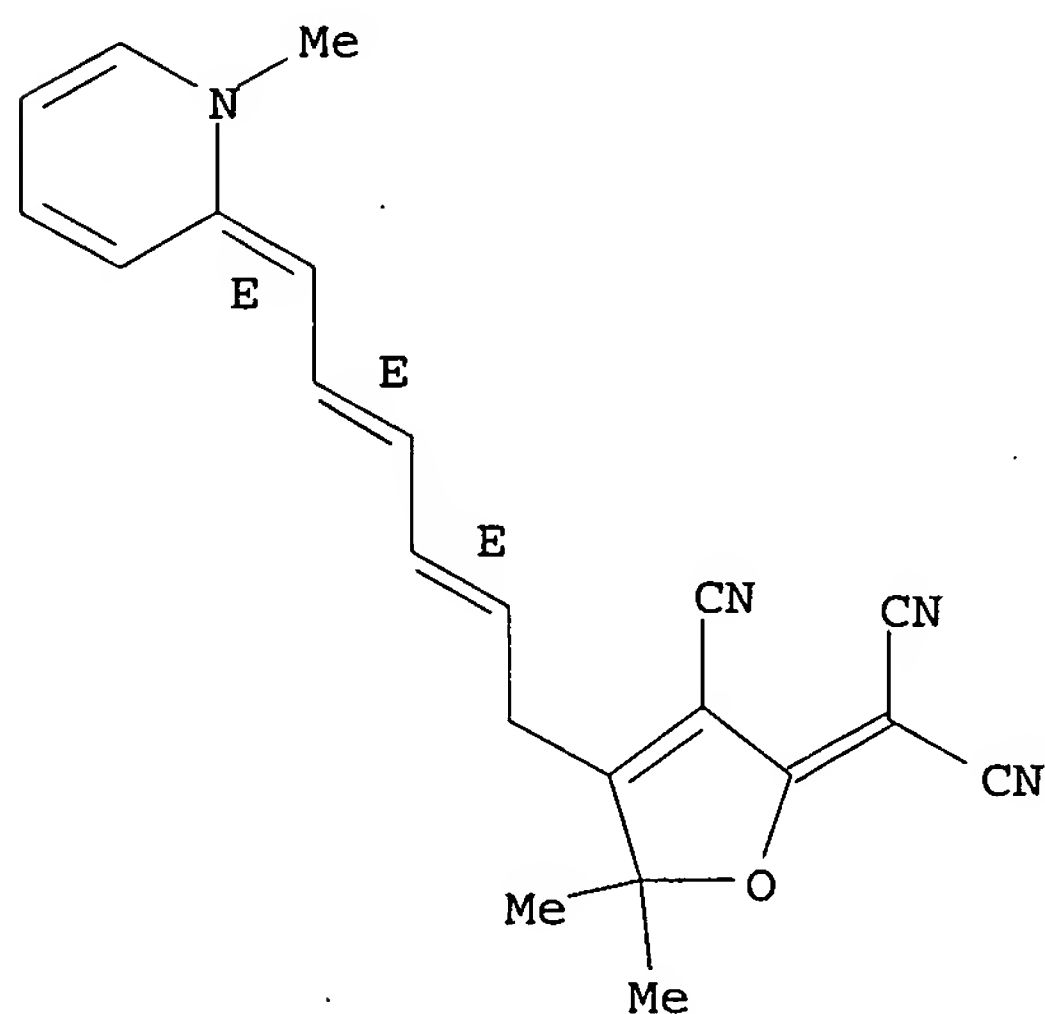
Double bond geometry as shown.



RN 712273-86-4 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(2E,4E,6E)-6-(1-methyl-2(1H)-pyridinylidene)-2,4-hexadienyl]-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

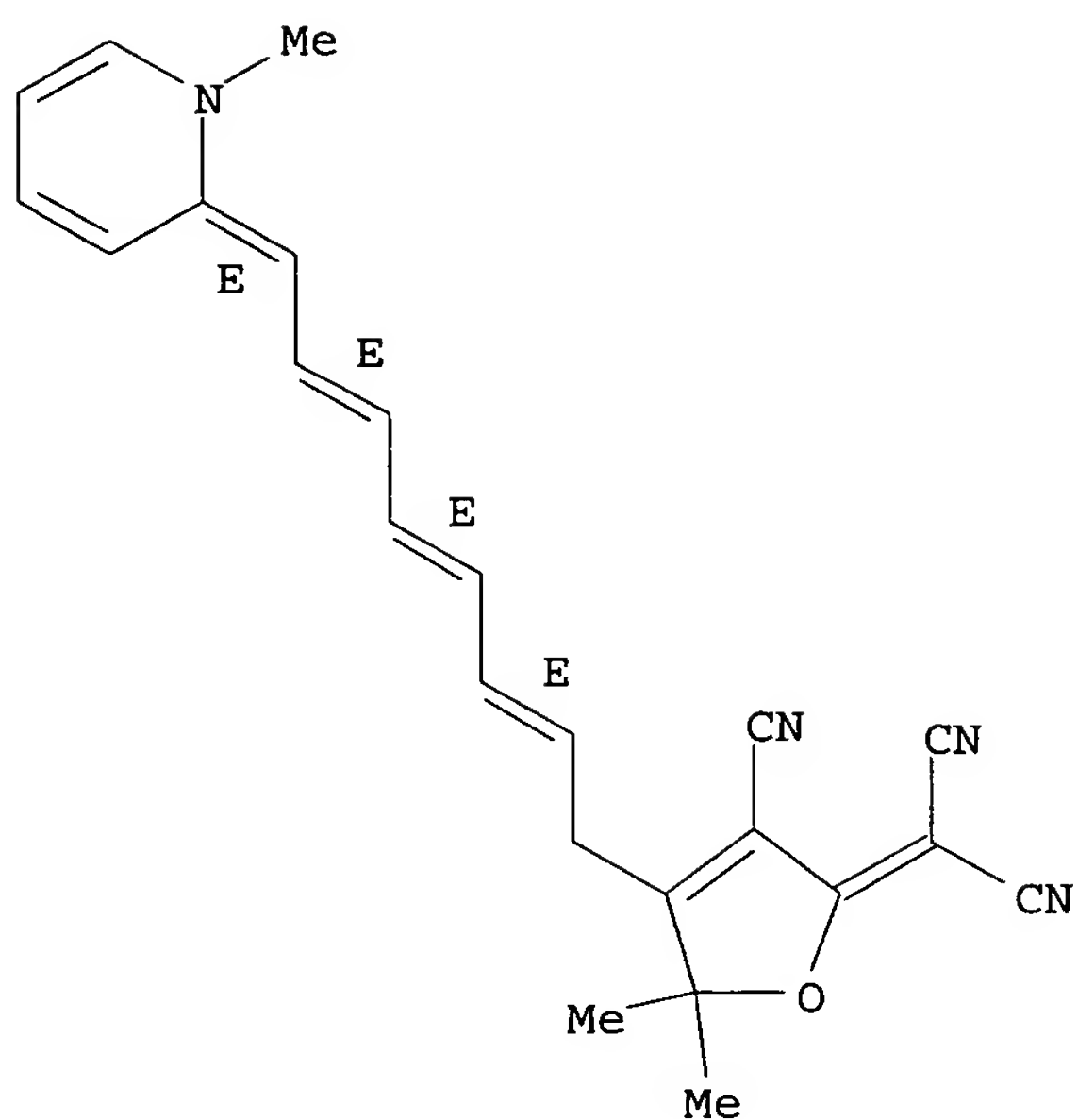
Double bond geometry as shown.



RN 712273-87-5 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(2E,4E,6E,8E)-8-(1-methyl-2(1H)-pyridinylidene)-2,4,6-octatrienyl]-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

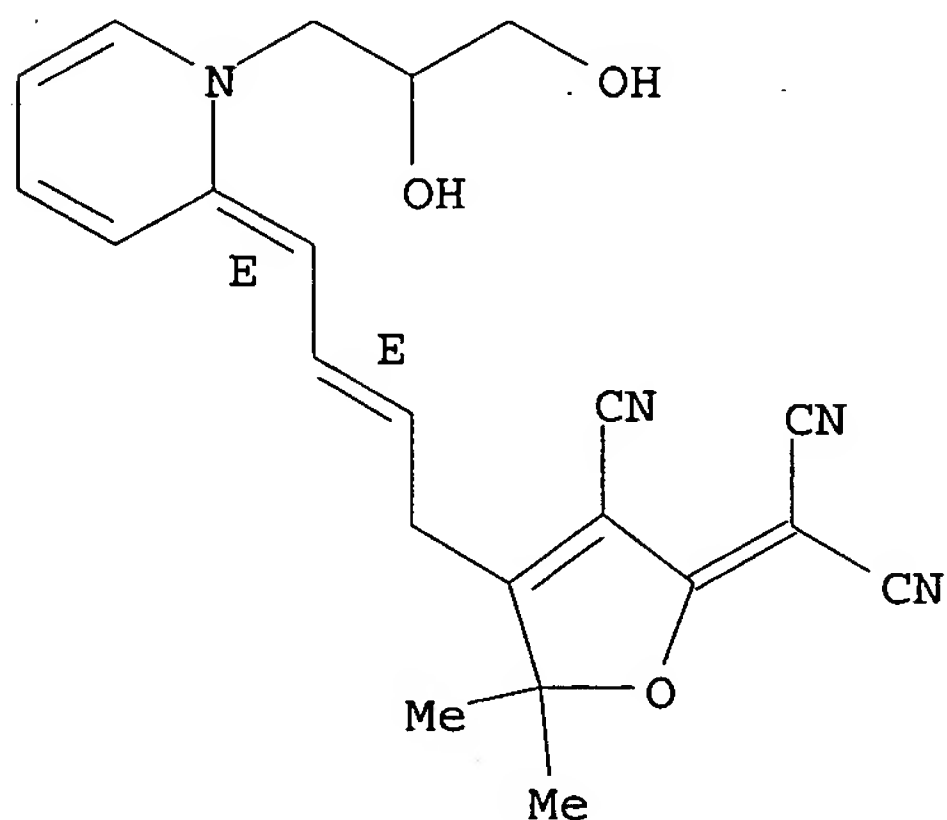
Double bond geometry as shown.



RN 712273-88-6 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E,4E)-4-[1-(2,3-dihydroxypropyl)-2(1H)-pyridinylidene]-2-butenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]-2,4-hexadienyl (CA INDEX NAME)

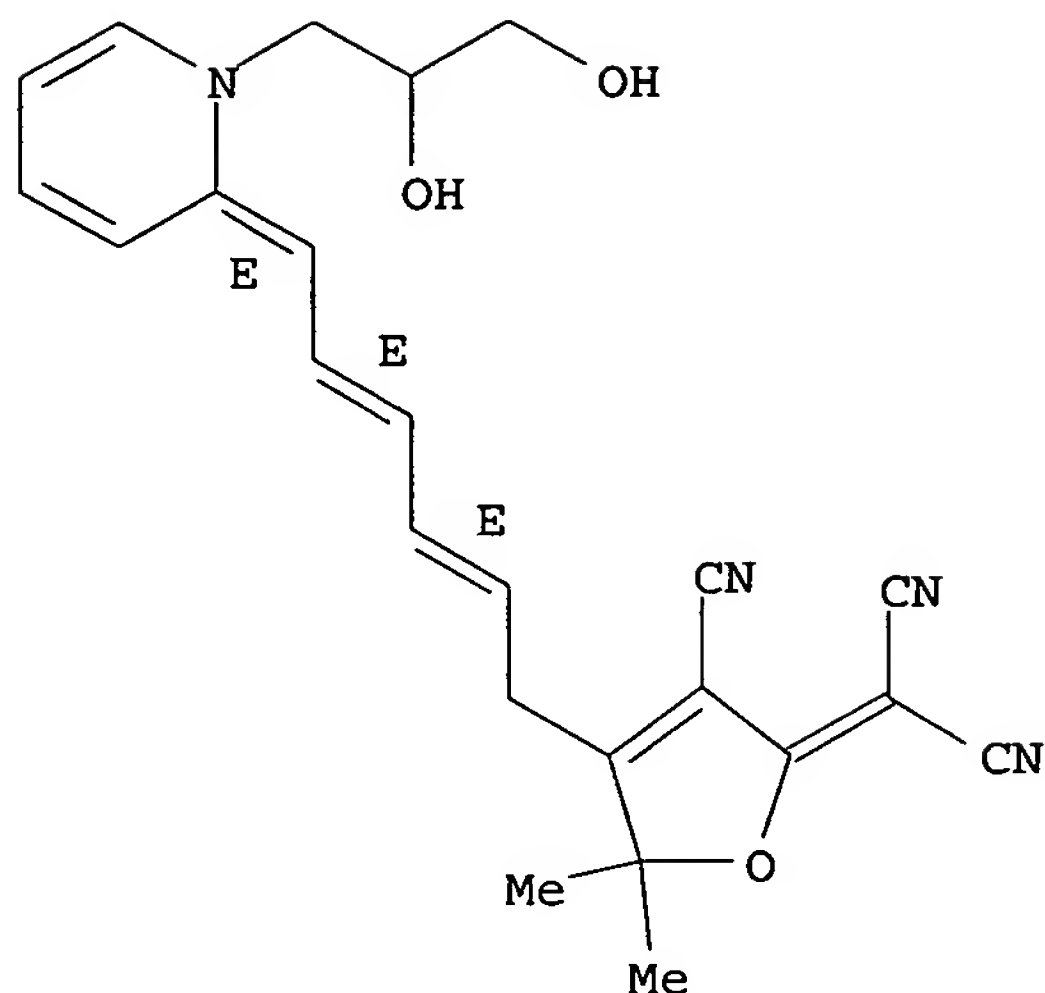
Double bond geometry as shown.



RN 712273-89-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E,4E,6E)-6-[1-(2,3-dihydroxypropyl)-2(1H)-pyridinylidene]-2,4-hexadienyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]-2,4-hexadienyl (CA INDEX NAME)

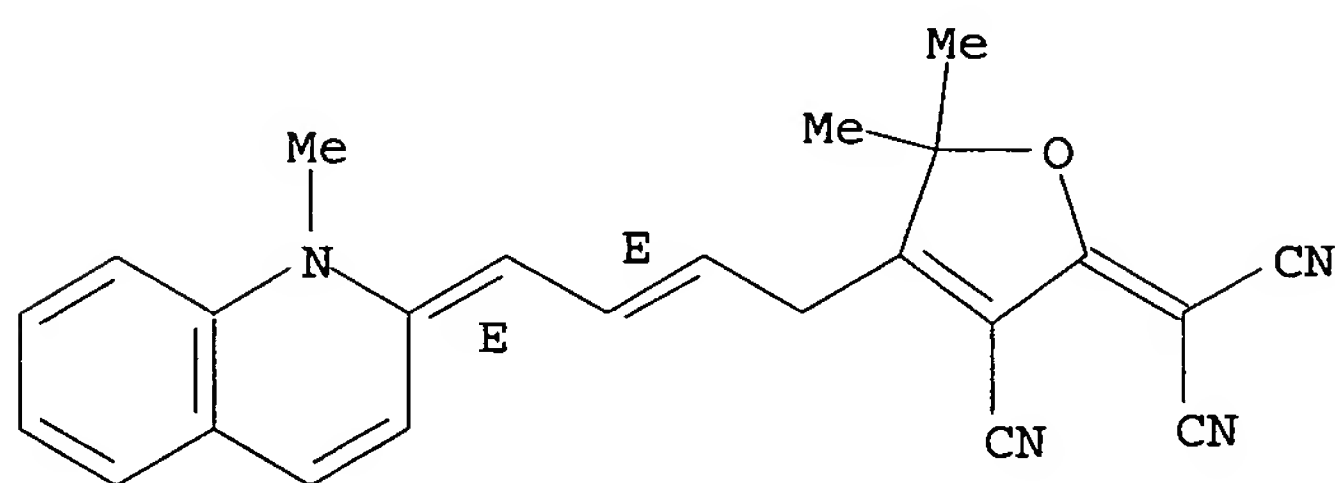
Double bond geometry as shown.



RN 712273-91-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(2E,4E)-4-(1-methyl-2(1H)-quinolinylidene)-2-butenyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

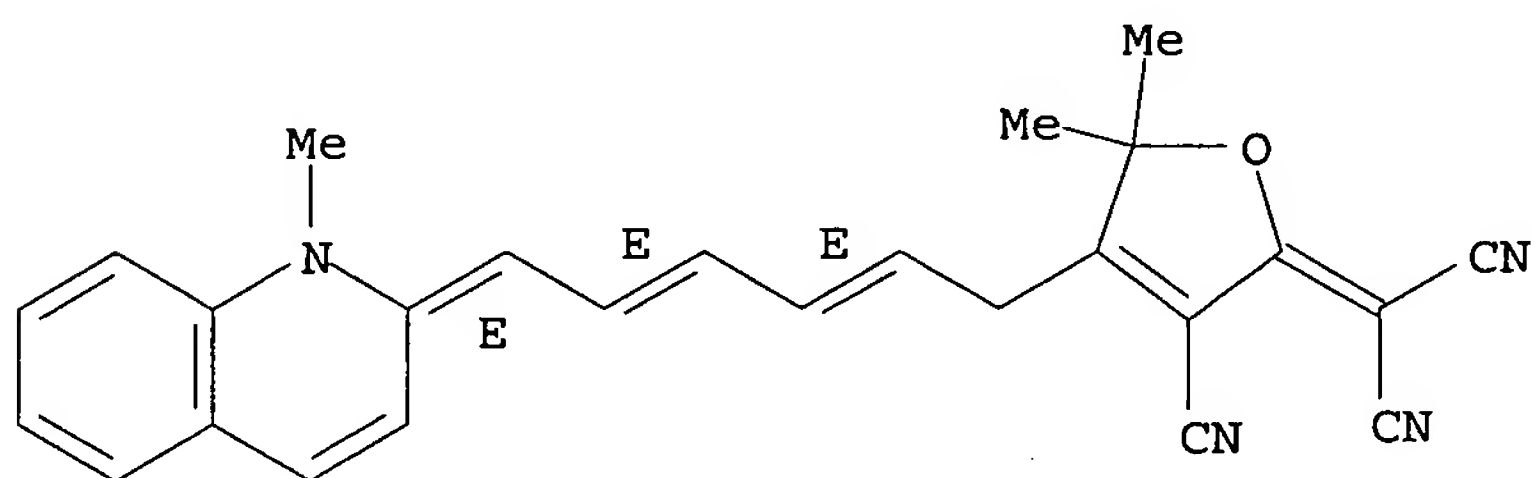
Double bond geometry as shown.



RN 712273-93-3 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(2E,4E,6E)-6-(1-methyl-2(1H)-quinolinylidene)-2,4-hexadienyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

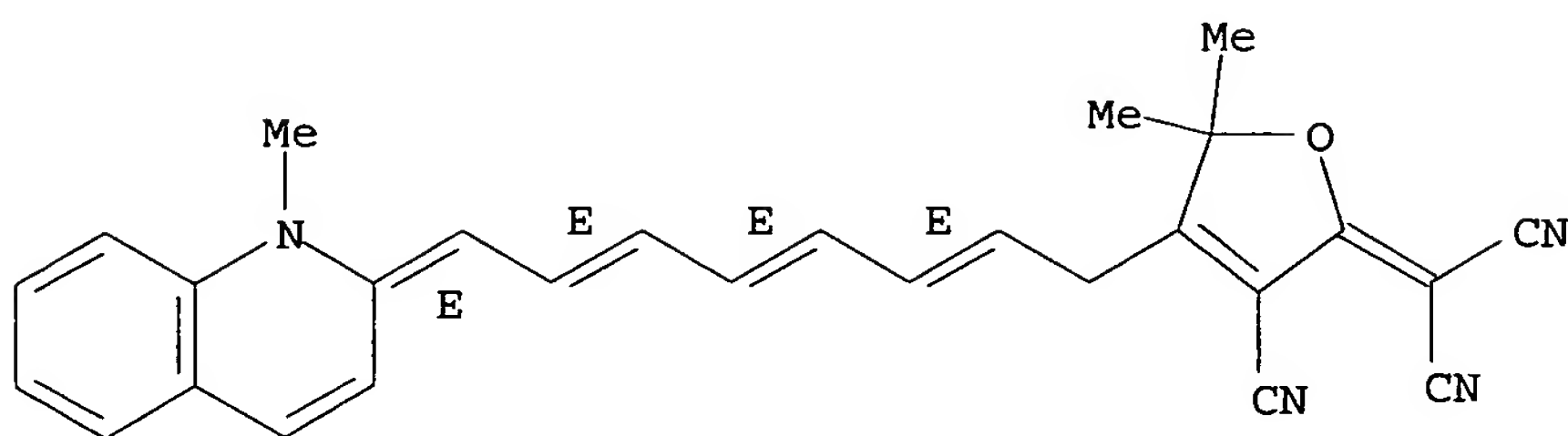
Double bond geometry as shown.



RN 712273-94-4 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(2E,4E,6E,8E)-8-(1-methyl-2(1H)-quinolinylidene)-2,4,6-octatrienyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 20 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:270916 HCAPLUS

DOCUMENT NUMBER: 141:25071

TITLE: Thermally stable triaryl amino chromophores with high molecular hyperpolarizabilities

AUTHOR(S): Spraul, Bryan K.; Suresh, S.; Sassa, Takafumi; Angeles Herranz, M.; Echegoyen, Luis; Wada, Tatsuo; Perahia, Dvora; Smith, Dennis W.

CORPORATE SOURCE: Department of Chemistry, Clemson University, Clemson, SC, 29634, USA

SOURCE: Tetrahedron Letters (2004), 45(16), 3253-3256

CODEN: TELEAY; ISSN: 0040-4039

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The synthesis of a series of high temperature triaryl amino chromophores with unprecedented hyperpolarizability values for potential EO applications is described. 4-(N,N-di-p-anisylamino)phenyl donors are for the first time bridged to powerful acceptors such as tricyanovinylidenehydrofuran via vinyl thiophene linkages. The chromophores are readily soluble in common organic solvents, exhibit useful absorptions and high thermal decomposition temps. (highest Td=358°). Mol. hyperpolarizabilities ( $\beta$ ) of the chromophores were measured by Hyper Rayleigh Scattering (HRS) at 1604 nm, which gave  $\beta$  values from 1000 to 20,000 + 10-30 esu. The electrochem. behavior of the chromophores were studied by cyclic voltammetry, and agree well with the intrinsic nonlinearities observed. These chromophores are of particular interest due to their large optical nonlinearities, transparency in the near IR, high thermal decomposition temps., and their potential to be incorporated into polymeric materials.

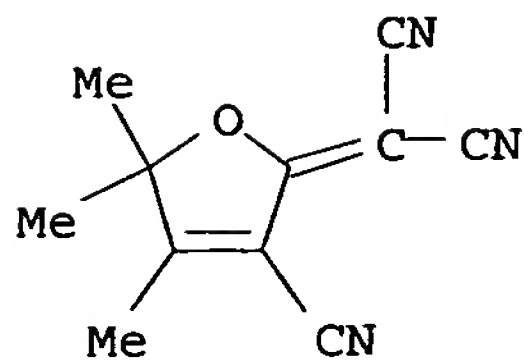
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(in preparation of thermally stable triaryl amino chromophores with high mol. hyperpolarizabilities)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 33 THERE ARE 33 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 21 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:242412 HCAPLUS

DOCUMENT NUMBER: 140:414149

TITLE: Dramatic enhancement of photorefractive properties by controlling the electron trap density in a monolithic material

AUTHOR(S): You, Wei; Hou, Zhanjia; Yu, Luping

CORPORATE SOURCE: Department of Chemistry and The James Frank Institute, The University of Chicago, Chicago, IL, 60637, USA

SOURCE: Advanced Materials (Weinheim, Germany) (2004), 16(4), 356-360

CODEN: ADVMEW; ISSN: 0935-9648

PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA

DOCUMENT TYPE: Journal

LANGUAGE: English

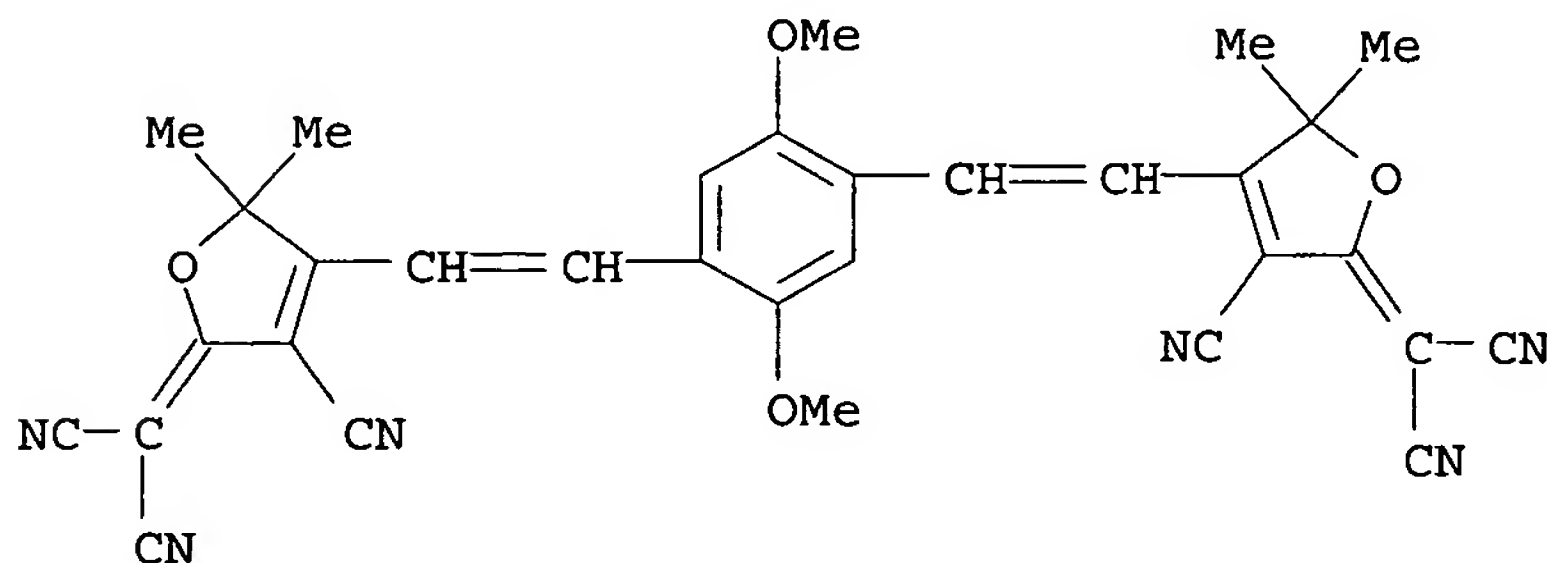
AB A highly efficient organic photorefractive (PR) system was prepared by doping a small amount of electron trapping moiety to a monolithic material. These materials exhibit large optical gain and high efficiency at a relatively low external elec. field. Detailed studies unambiguously revealed the role of the trapping moiety and provided the first example that deliberate addition of carefully designed trapping mols. can dramatically enhance the PR performances of organic PR materials.

IT 689260-94-4P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (electron trapping mol. core; enhancement of photorefractive properties by controlling the electron trap d. in monolithic material)

RN 689260-94-4 HCAPLUS

CN Propanedinitrile, 2,2'-[(2,5-dimethoxy-1,4-phenylene)bis[2,1-ethenediyl(3-cyano-5,5-dimethyl-4-furanyl-2(5H)-ylidene)]]bis- (9CI) (CA INDEX NAME)



IT 689260-95-5P

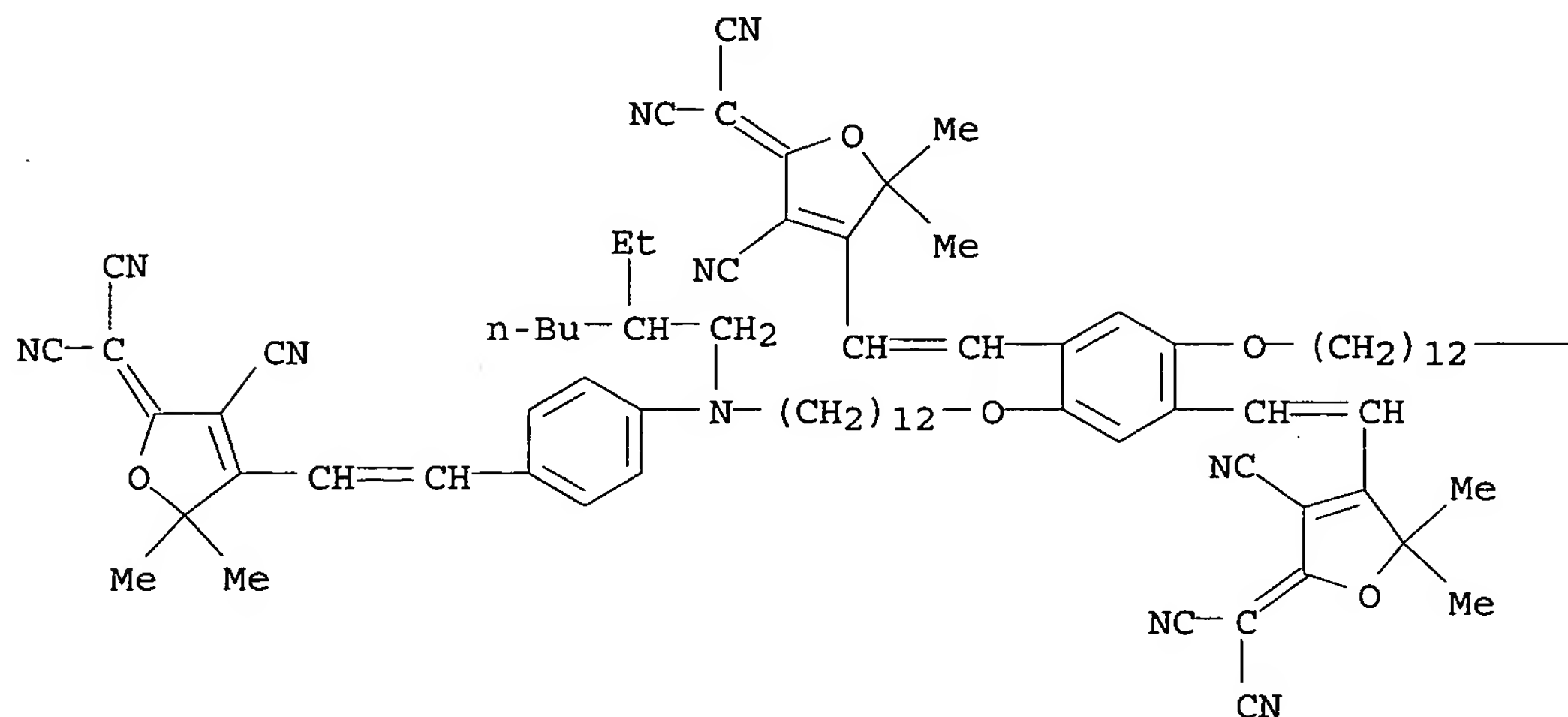
RL: MOA (Modifier or additive use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); PREP (Preparation); PROC (Process); USES (Uses)

(electron trapping mol.; enhancement of photorefractive properties by controlling the electron trap d. in monolithic material)

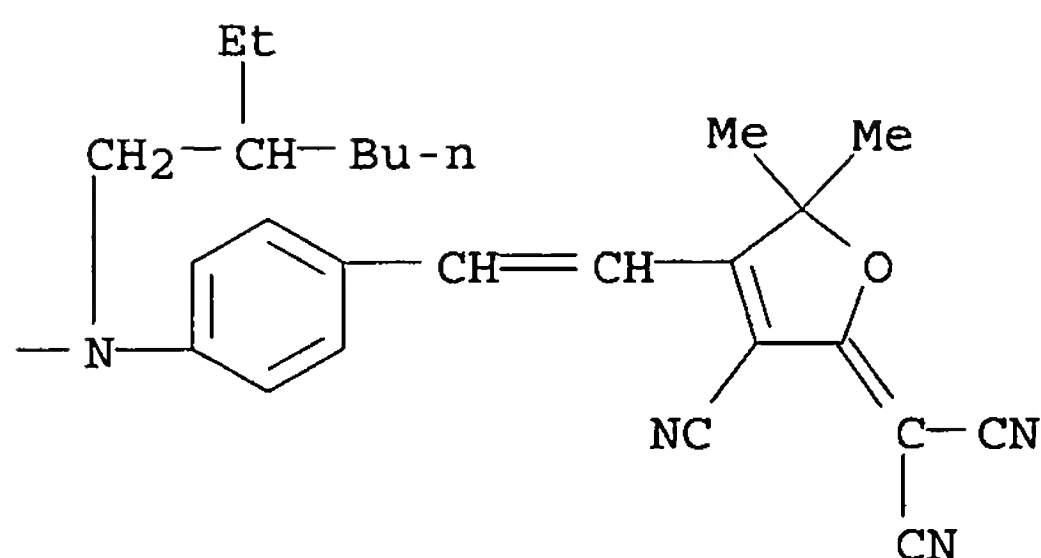
RN 689260-95-5 HCAPLUS

CN Propanedinitrile, 2,2'-[[2,5-bis[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-1,4-phenylene]bis[oxy-12,1-dodecanediyl[(2-ethylhexyl)imino]-4,1-phenylene-2,1-ethenediyl(3-cyano-5,5-dimethyl-4-furanyl-2(5H)-ylidene)]]bis- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



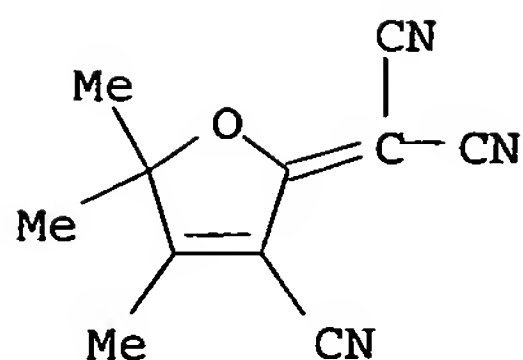
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(enhancement of photorefractive properties by controlling the electron trap d. in monolithic material)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)

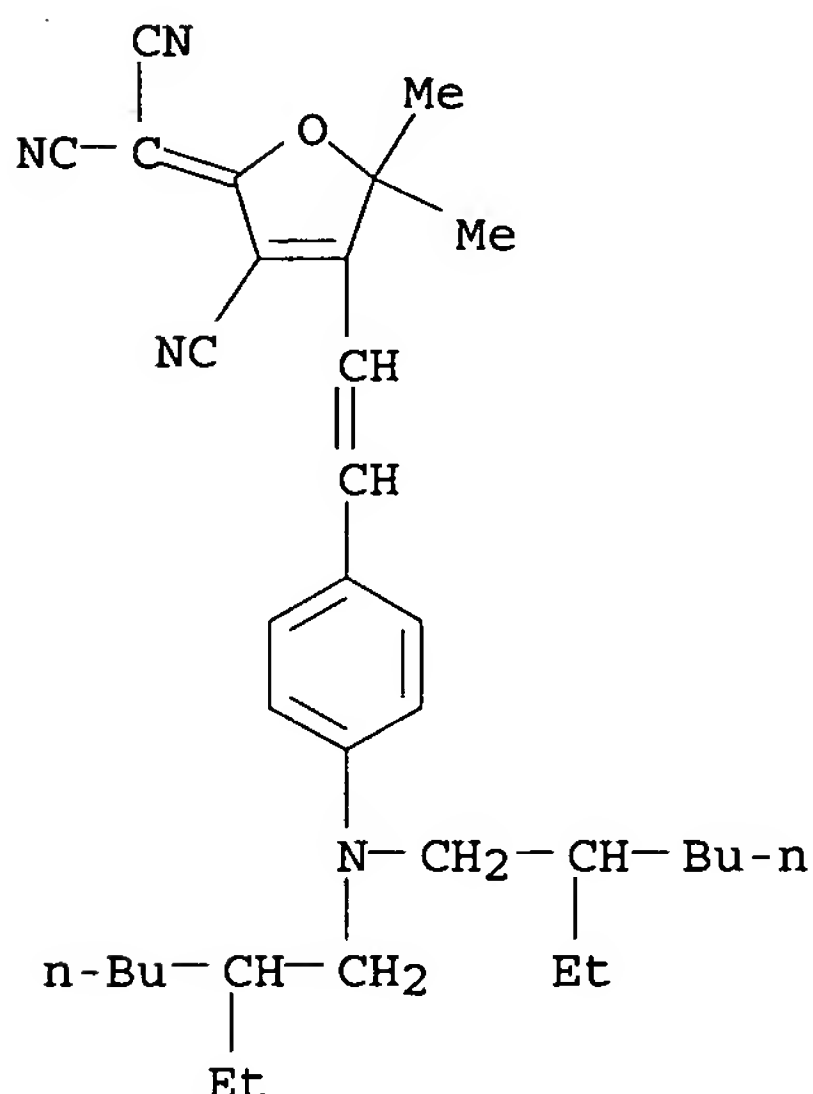


IT 481642-79-9

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)  
(monolithic mol. material; enhancement of photorefractive properties by controlling the electron trap d. in monolithic material)

RN 481642-79-9 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 22 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:240011 HCAPLUS

DOCUMENT NUMBER: 141:174026

TITLE: Synthesis of a novel organic nonlinear optical molecule MC-FTC

AUTHOR(S): Yin, Dong-Dong; Ren, Yu; Zhai, Jian-Feng; Qiu, Ling; Shen, Yu-Quan

CORPORATE SOURCE: Department of Chemistry, Beijing Normal University, Beijing, 100875, Peop. Rep. China

SOURCE: Huaxue Xuebao (2004), 62(5), 518-522  
CODEN: HHHPA4; ISSN: 0567-7351

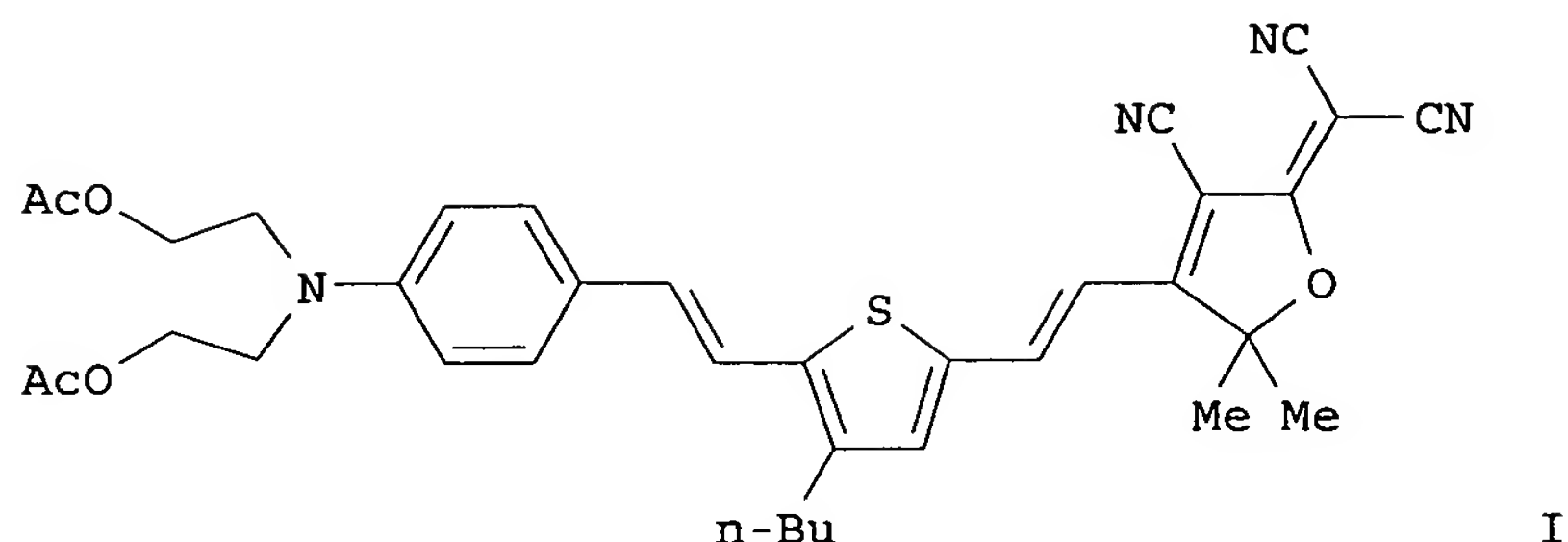
PUBLISHER: Kexue Chubanshe

DOCUMENT TYPE: Journal

LANGUAGE: Chinese

OTHER SOURCE(S): CASREACT 141:174026

GI



AB A novel organic nonlinear optical chromophore, 2-dicyanomethylene-3-cyano-4-{2-[2-(4-(N,N-di-(2-acetoxyethyl)amino)phenyl)vinyl-3-(n-butyl)thien-5-yl]vinyl}-5,5-dimethyl-2,5-dihydrofuran (I) (denoted as MC-FTC), has been designed and synthesized. The detailed synthetic procedure was reported. The chemical structures of the related intermediates and the target product has been confirmed by IR, UV-Vis, NMR, MS and elemental anal.

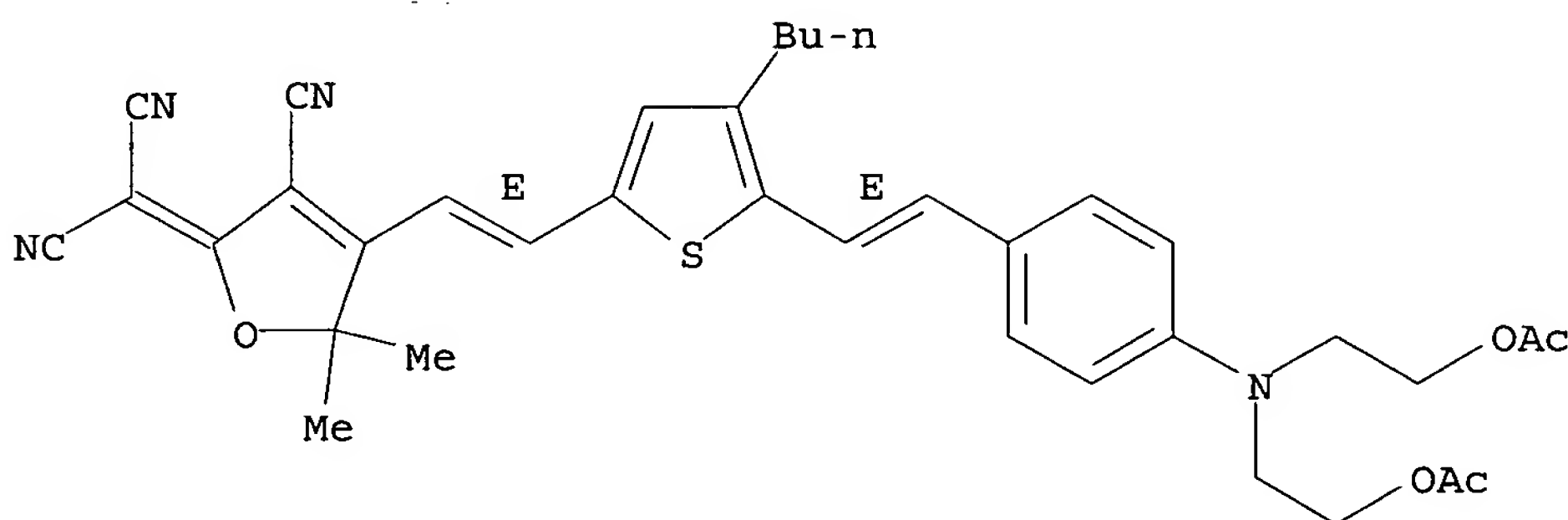
IT 733806-03-6P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(synthesis of organic nonlinear optical mol.)

RN 733806-03-6 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-4-butyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



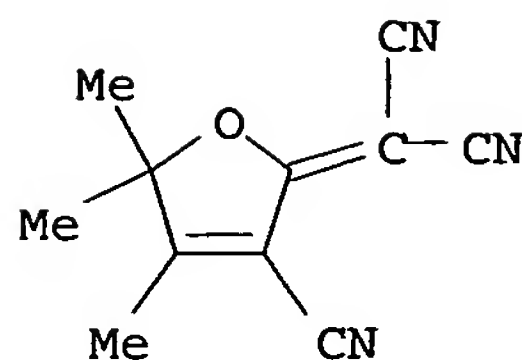
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)  
(synthesis of organic nonlinear optical mol.)

RN 171082-32-9 HCAPLUS

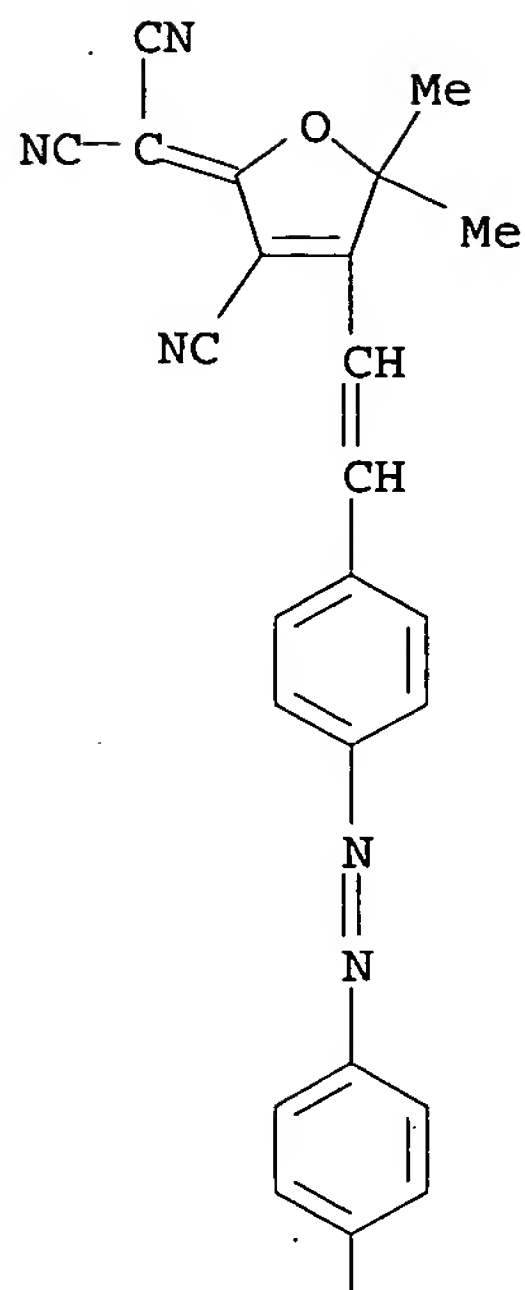
CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA INDEX NAME)



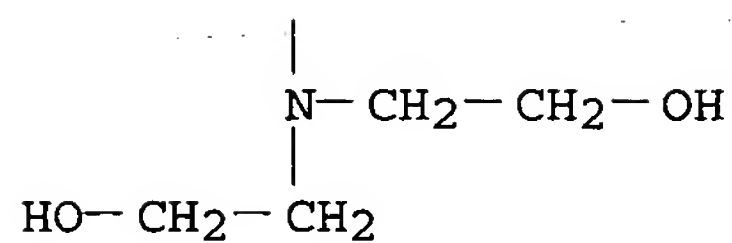


CN Propanedinitrile, [4-[2-[4-[[4-[bis(2-hydroxyethyl)amino]phenyl]azo]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene]-(9CI) (CA INDEX NAME)

PAGE 1-A



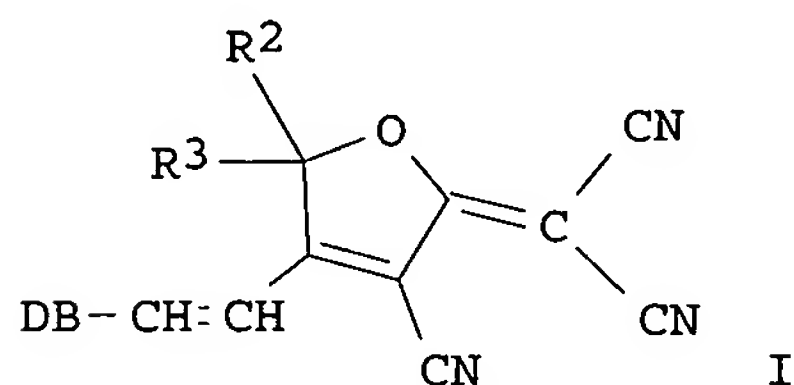
PAGE 2-A



RN 716378-72-2 HCAPLUS  
 CN Propanedinitrile, [4-[2-[2-[[4-[bis(2-hydroxyethyl)amino]phenyl]azo]-4-chloro-5-thiazolyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

SOURCE: U.S. Pat. Appl. Publ., 21 pp.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2003201429	A1	20031030	US 2002-136869	20020430
EP 1359461	A2	20031105	EP 2003-76245	20030429
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, SK				
CN 1461750	A	20031217	CN 2003-130777	20030430
PRIORITY APPLN. INFO.:			US 2002-136869	A 20020430
OTHER SOURCE(S):	MARPAT 139:355879			
GI				



AB An electro-optic chromophore is described comprising a compound having a general formula I, wherein D = an electron donor having one or a plurality of terminally pendent, polymerizable cyclic ether or cyclic thioether groups; B = at least one bivalent aromatic ring or derivs.; and R2 and R3 = (each, independently) H, or a (un)substituted C1-C10 alkyl, a (un)substituted C2-C10 alkenyl, a (un)substituted aryl, a (un)substituted alkylaryl, a (un)substituted carbocycle, a (un)substituted heterocycle, or a (un)substituted cyclohexyl; or R2 and R3 together form a (substituted) ring structure. The chromophore may have nonlinear optical property and may be photocurable. An optical device using the chromophore is also described. A method of fabricating an optical or electro-optic structure containing a photodefinable high  $\mu\beta$  chromophore layer is also described.

IT 618439-10-4P

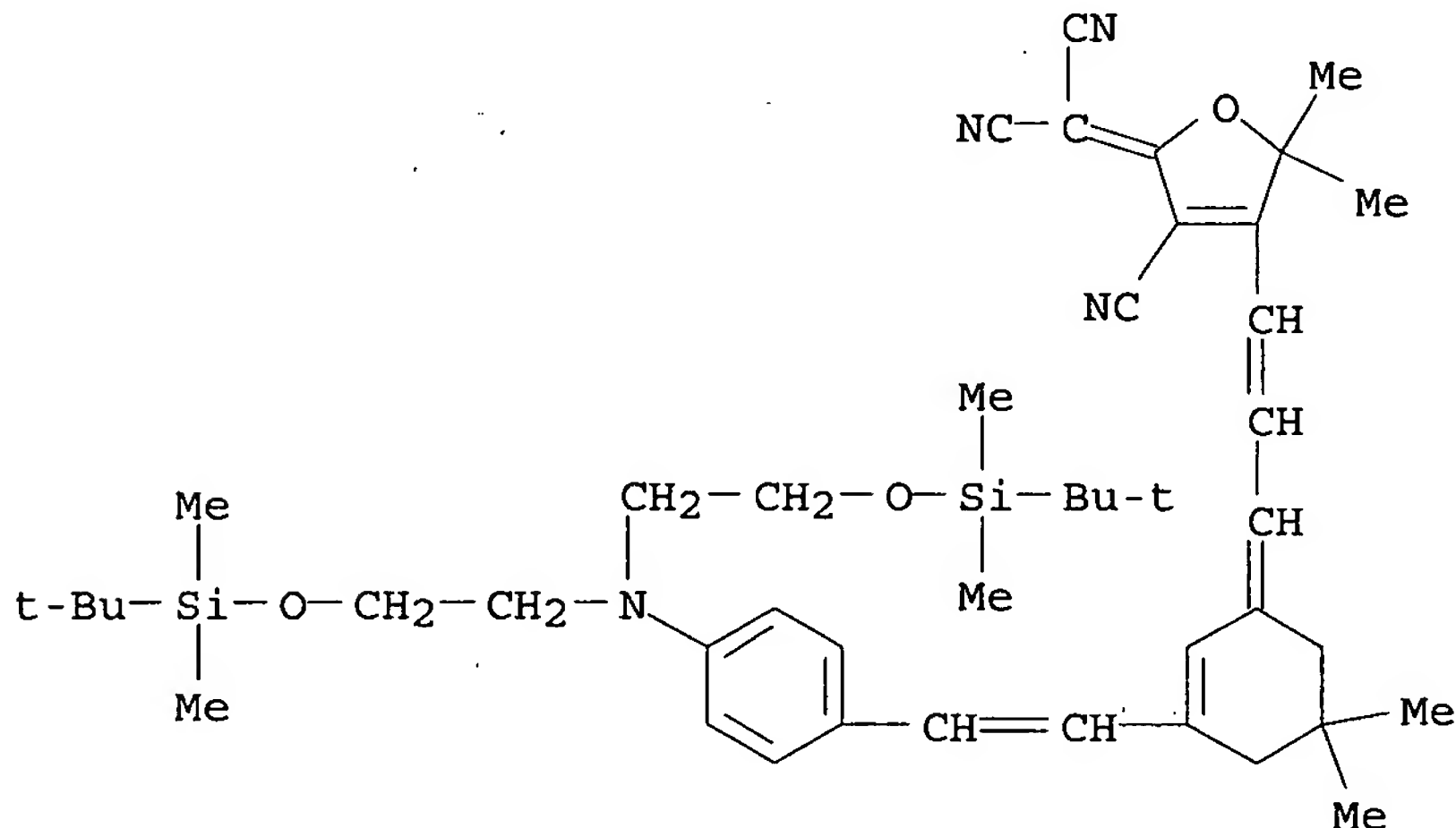
RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)  
 (chromophore; low loss electro-optic polymers and devices using them)

RN 618439-10-4 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[2-[3,4-dihexyl-5-[2-[4-[methyl(oxiranylmethyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

PUBLISHER:	SPIE-The International Society for Optical Engineering
DOCUMENT TYPE:	Journal
LANGUAGE:	English

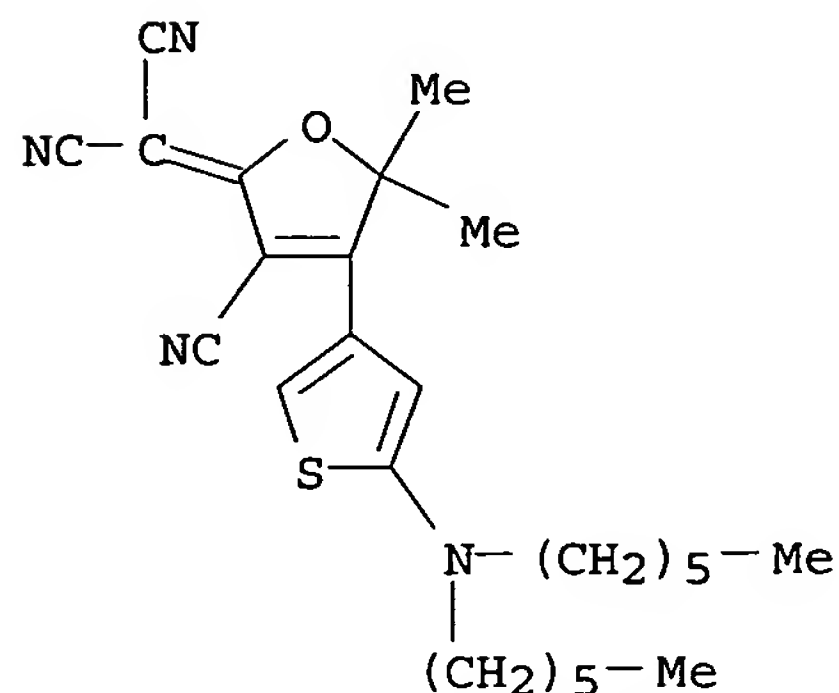
CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



PATENT ASSIGNEE(S) : USA

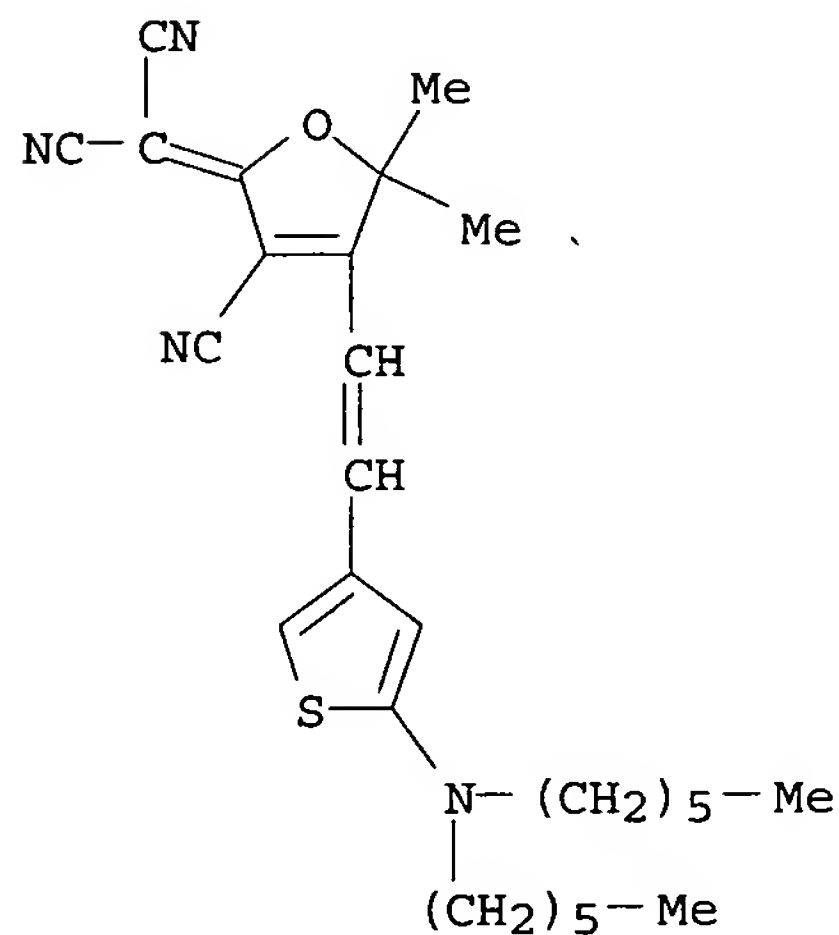
RN 500198-24-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[5-(dihexylamino)-3-thienyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



RN 500198-25-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-(dihexylamino)-3-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 29 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:891021 HCAPLUS

DOCUMENT NUMBER: 141:67473

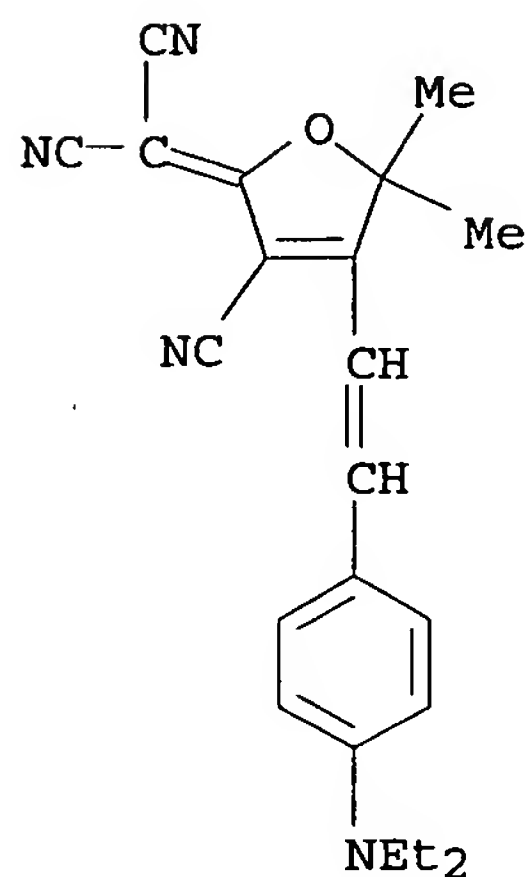
TITLE: Deoxyribonucleic acid (DNA)-based nonlinear optics

AUTHOR(S): Grote, James G.; Ogata, Naoya; Hagen, Joshua A.; Heckman, Emily; Curley, Michael J.; Yaney, Perry P.; Stone, Morley O.; Diggs, Darnell E.; Nelson, Robert L.; Zetts, John S.; Hopkins, Frank K.; Dalton, Larry R.

CORPORATE SOURCE: US Air Force Research Laboratory, Materials and Manufacturing Directorate, AFRL/MLPS, Wright-Patterson Air Force Base, OH, 45433, USA

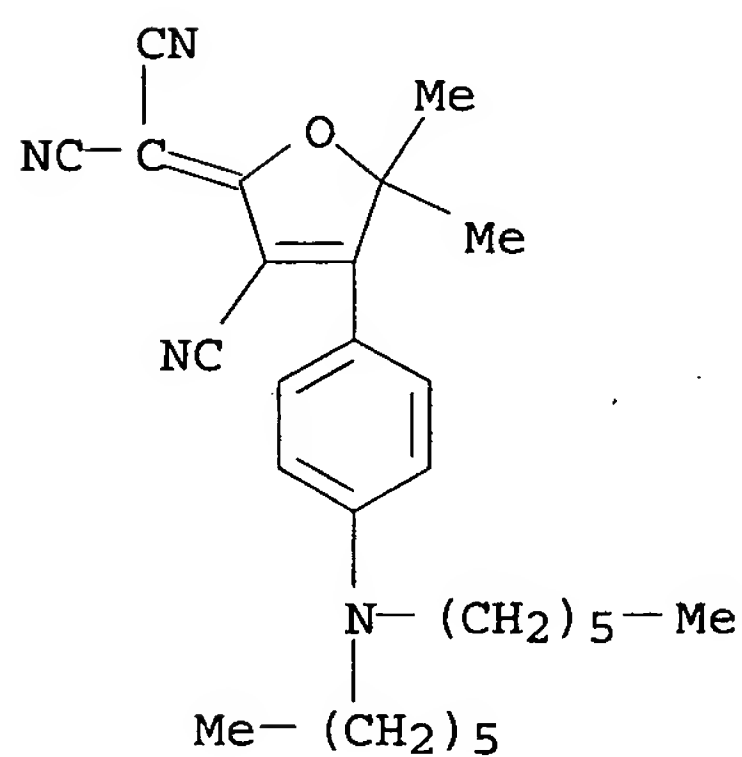
SOURCE: Proceedings of SPIE-The International Society for

dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



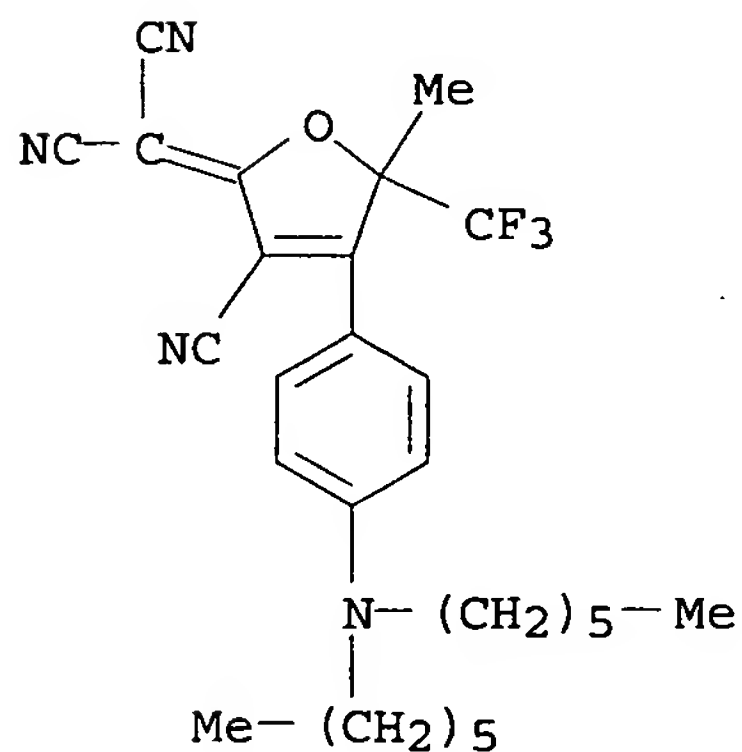
RN 402490-54-4 HCAPLUS

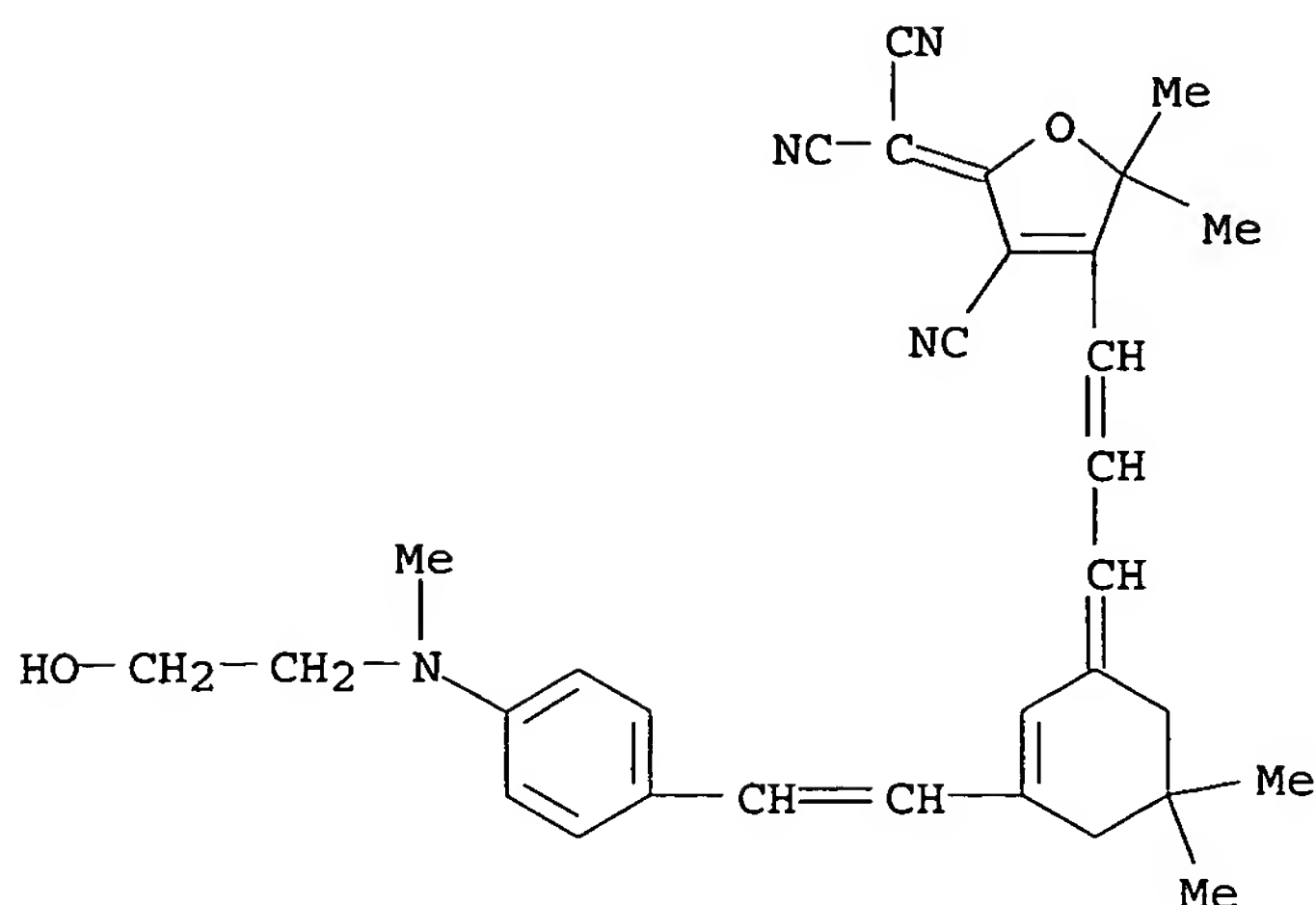
CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 481642-78-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)





REFERENCE COUNT: 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 28 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:939698 HCAPLUS

DOCUMENT NUMBER: 141:133276

TITLE: Novel fluorophores for single-molecule imaging

AUTHOR(S): Willets, Katherine A.; Ostroverkhova, Oksana; Hess, Stephan; He, Meng; Twieg, Robert J.; Moerner, William E.

CORPORATE SOURCE: Department of Chemistry, Stanford Univ., Stanford, CA, USA

SOURCE: Proceedings of SPIE-The International Society for Optical Engineering (2003), 5222(Nanocrystals, and Organic and Hybrid Nanomaterials), 150-157

CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A new class of fluorophores has been identified that can be imaged at the single-mol. level and offer addnl. beneficial properties such as a significant ground state dipole moment, moderate hyperpolarizability, and sensitivity to local rigidity. These mols. contain an amine donor and a dicyanodihydrofuran (DCDHF) acceptor linked by a conjugated unit (benzene, thiophene, alkene, styrene, etc.) and were originally designed to deliver both high polarizability anisotropy and dipole moment as nonlinear optical chromophores for photorefractive applications. Surprisingly, we have found that these mols. are also well-suited for single-mol. fluorescence imaging in polymers and other reasonably rigid environments. We report the bulk (ensemble) and single-mol. photophys. properties measured for six dyes in this new class of single-mol. reporters, with absorption maxima ranging from 486 to 614 nm.

IT 296280-34-7 402490-54-4 481642-78-8

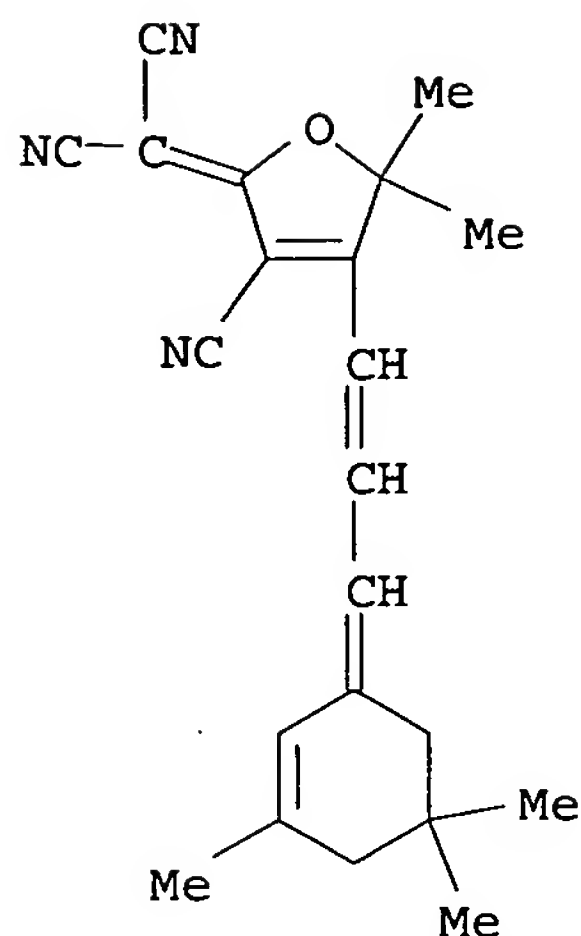
500198-24-3 500198-25-4

RL: ARG (Analytical reagent use); PRP (Properties); ANST (Analytical study); USES (Uses)

(fluorophores based on dicyanodihydrofuran acceptors paired with amine donors for single-mol. imaging)

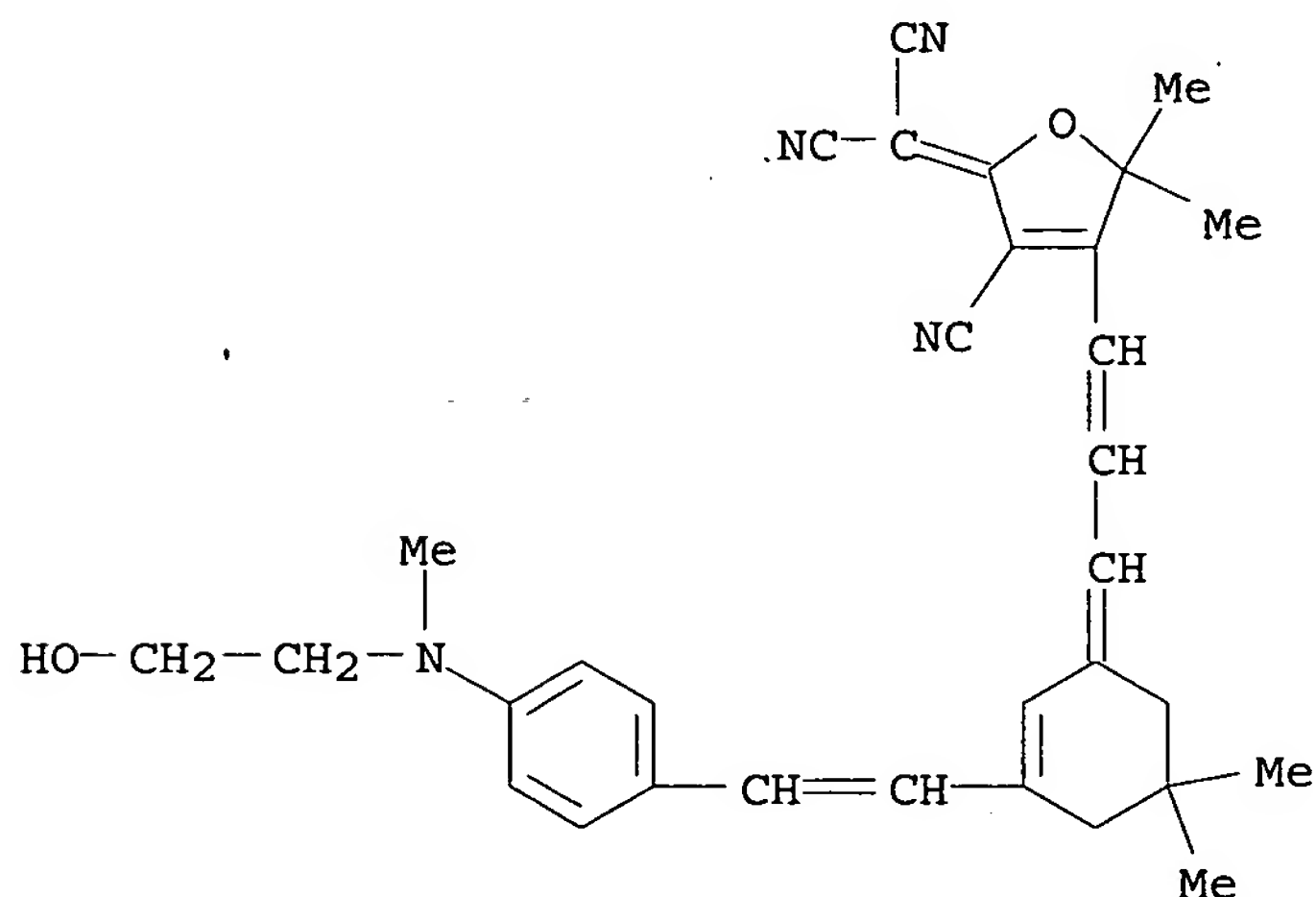
RN 296280-34-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-



RN 663954-06-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-[(2-hydroxyethyl)methylamino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



IT 663954-06-1DP, reaction products with Me vinyl

isocyanate-adamantyl methacrylate copolymer

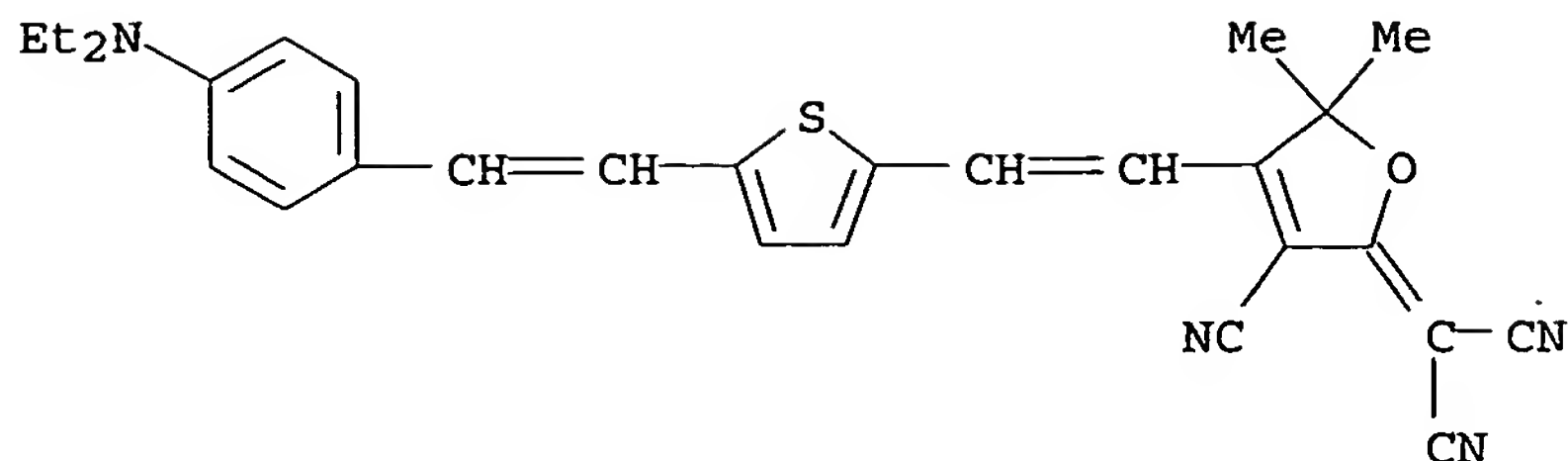
RL: SPN (Synthetic preparation); PREP (Preparation)

(nonlinear optical active poly(adamantyl methacrylate-Me vinyl urethane)s functionalised with phenyltetraene-bridged chromophore)

RN 663954-06-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-[(2-hydroxyethyl)methylamino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)





REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 27 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:968847 HCAPLUS

DOCUMENT NUMBER: 140:218209

TITLE: Nonlinear optical active poly(adamantyl methacrylate-methyl vinyl urethane)s functionalised with phenyltetraene-bridged chromophore

AUTHOR(S): Briers, D.; Picard, I.; Verbiest, T.; Persoons, A.; Samyn, C.

CORPORATE SOURCE: Laboratory of Macromolecular and Physical Organic Chemistry, Katholieke Universiteit Leuven, Heverlee, 3001, Belg.

SOURCE: Polymer (2004), 45(1), 19-24  
CODEN: POLMAG; ISSN: 0032-3861

PUBLISHER: Elsevier Science Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Nonlinear optical (NLO) poly(adamantyl methacrylate-methylvinylurethane)s were prepared by functionalisation of adamantyl methacrylate vinyl isocyanate precursor polymers. A modified pathway to obtain phenyltetraene-bridged chromophore was worked out. Poled films of the polymers show high and very stable NLO response even at elevated temps.

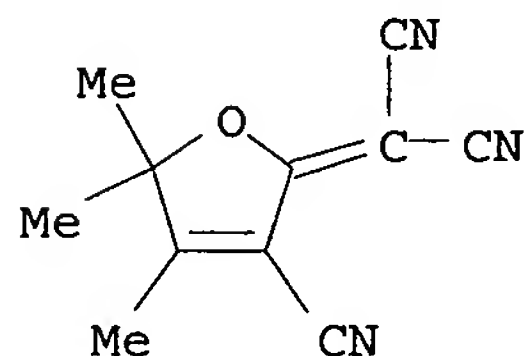
IT 171082-32-9P 663954-05-0P 663954-06-1P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(nonlinear optical active poly(adamantyl methacrylate-Me vinyl urethane)s functionalised with phenyltetraene-bridged chromophore)

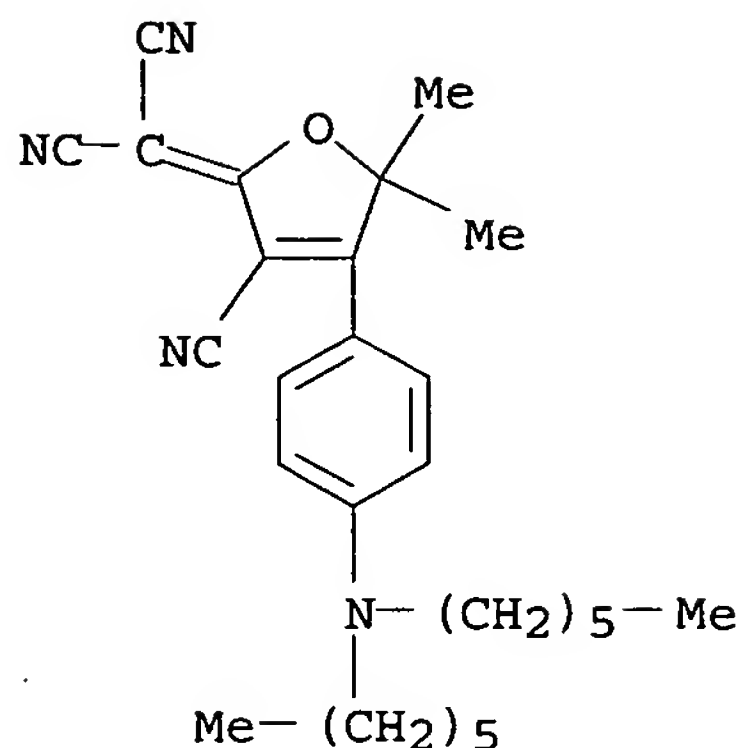
RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanlydene) - (9CI) (CA INDEX NAME)



RN 663954-05-0 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[3-(3,5,5-trimethyl-2-cyclohexen-1-ylidene)-1-propenyl]-2(5H)-furanlydene] - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 26 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:970715 HCAPLUS

DOCUMENT NUMBER: 141:164293

TITLE: Simple reflection measurement of nonlinear optical activity using silicon as an electrode

AUTHOR(S): Haller, Marnie A.; Lawson, Rhys; Clot, Olivier; Sherwood, Travis; Dalton, Larry; Jen, Alex K.

CORPORATE SOURCE: Department of Materials Science and Engineering, Univ. of Washington, Seattle, WA, 98195, USA

SOURCE: Proceedings of SPIE-The International Society for Optical Engineering (2003), 5212 (Linear and Nonlinear Optics of Organic Materials III), 326-331  
CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Future generations of photonic devices which incorporate poled organic nonlinear optical materials may be aided by, or require the use of non-traditional electrodes. This report details the integration of highly doped Si as one of the poling/modulating electrodes in the simple reflection type experiment for determination of nonlinear optical activity in a guest-host polymer system. The measurements illustrate that the behavior of doped-Si and the traditional In Sn oxide (ITO) electrodes are analogous. A number of organic chromophore guests were studied as well as multiple polymer hosts. Results demonstrate both successful poling and subsequent modulation of NLO materials, including the calcn. of r<sub>33</sub> values comparable to those achieved using a standard ITO electrode.

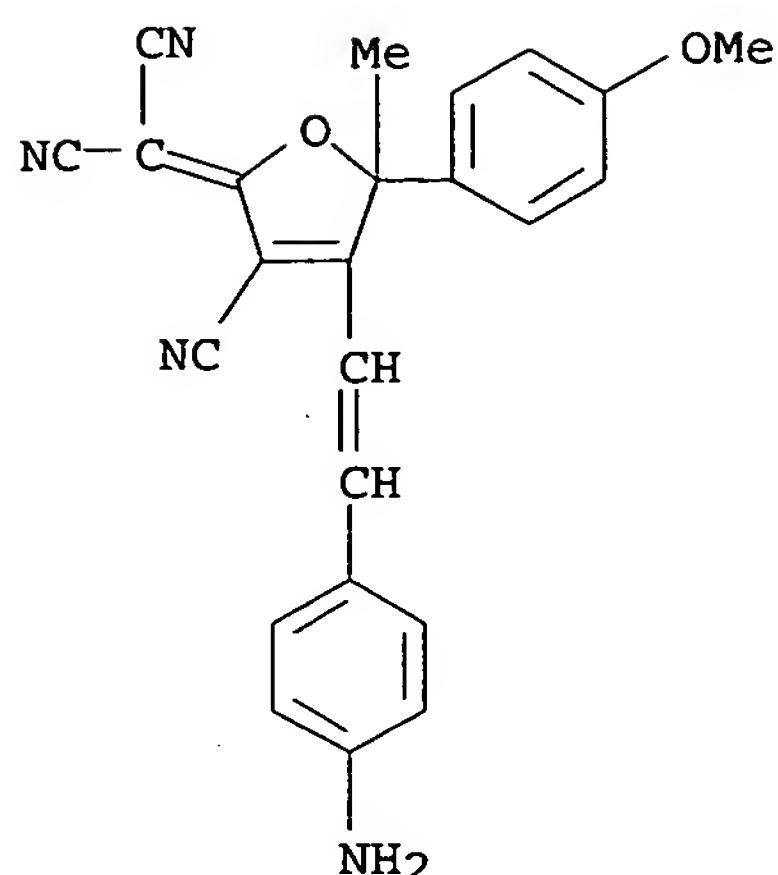
IT 729612-75-3

RL: PRP (Properties)

(simple reflection measurement of nonlinear optical activity using silicon as electrode)

RN 729612-75-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 25 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:22450 HCAPLUS

DOCUMENT NUMBER: 141:147651

TITLE: Self-trapping of light in an organic photorefractive glass

AUTHOR(S): Chen, Zhigang; Asaro, Marcus; Ostroverkhova, Oksana; Moerner, W. E.; He, Meng; Twieg, R. J.

CORPORATE SOURCE: Department of Physics and Astronomy, San Francisco State University, San Francisco, CA, 94132, USA

SOURCE: Optics Letters (2003), 28(24), 2509-2511

CODEN: OPLEDP; ISSN: 0146-9592

PUBLISHER: Optical Society of America

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The authors report the 1st observation, to our knowledge, of self-trapping of light as well as optically induced focusing-to-defocusing switching in an organic photorefractive glass, owing to the orientationally enhanced photorefractive nonlinearity of the material.

IT 402490-54-4, DCDHF-6

RL: PRP (Properties)

(self-trapping of light in organic photorefractive glass)

RN 402490-54-4 HCAPLUS

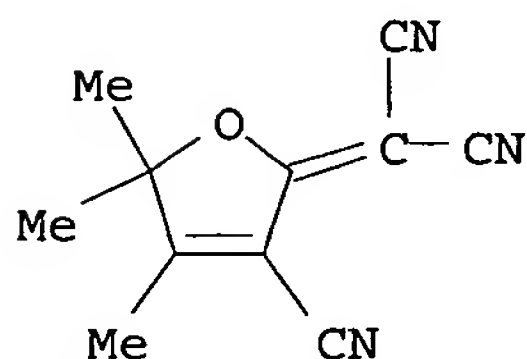
CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene] - (9CI) (CA INDEX NAME)

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(intermediate; preparation of triphenylmethane trisazo dyes for electrooptical NLO applications)

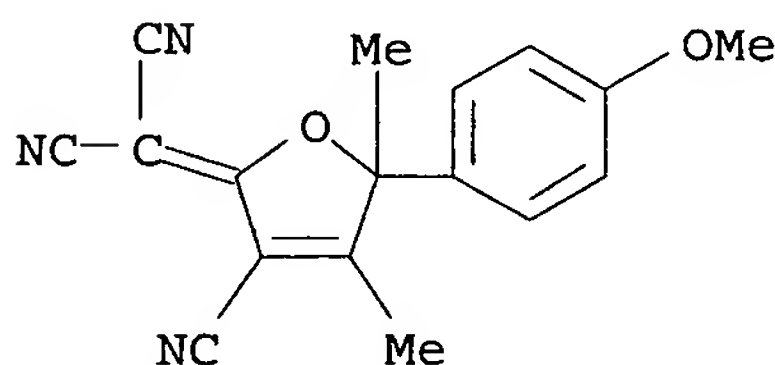
RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA INDEX NAME)



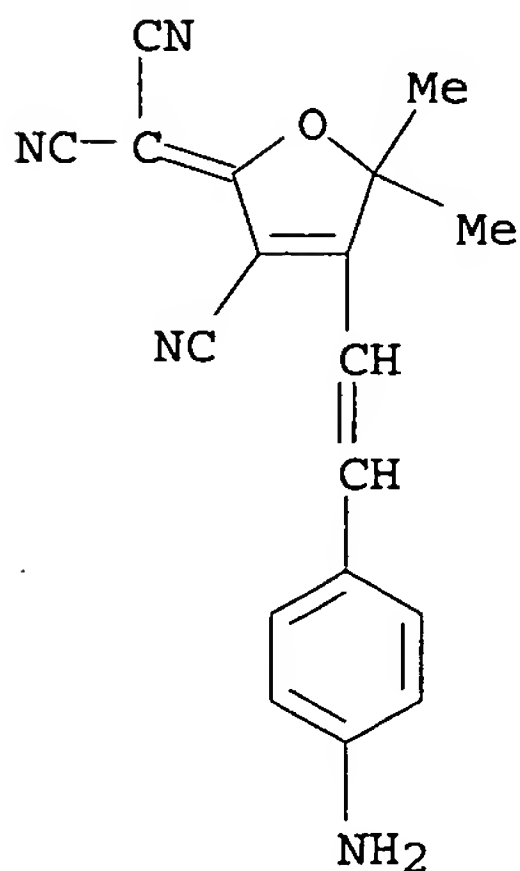
RN 668984-44-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-methoxyphenyl)-4,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 668984-45-0 HCAPLUS

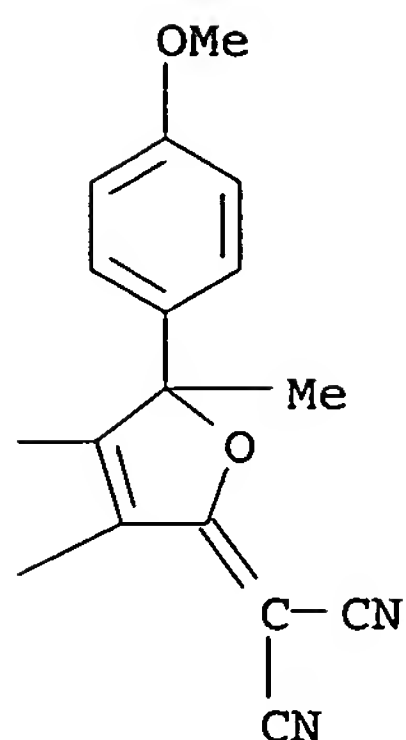
CN Propanedinitrile, [4-[2-(4-aminophenyl)ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 668984-46-1 HCAPLUS

CN Propanedinitrile, [4-[2-(4-aminophenyl)ethenyl]-3-cyano-5-(4-methoxyphenyl)-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

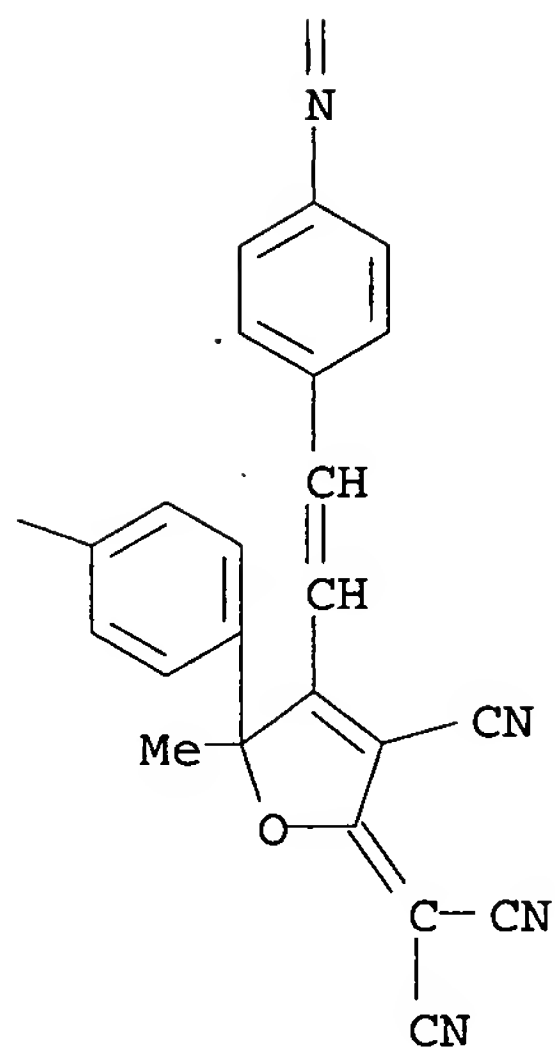
PAGE 1-C



PAGE 2-A

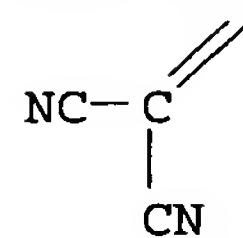
MeO—

PAGE 2-B



IT 171082-32-9P 668984-44-9P 668984-45-0P  
668984-46-1P

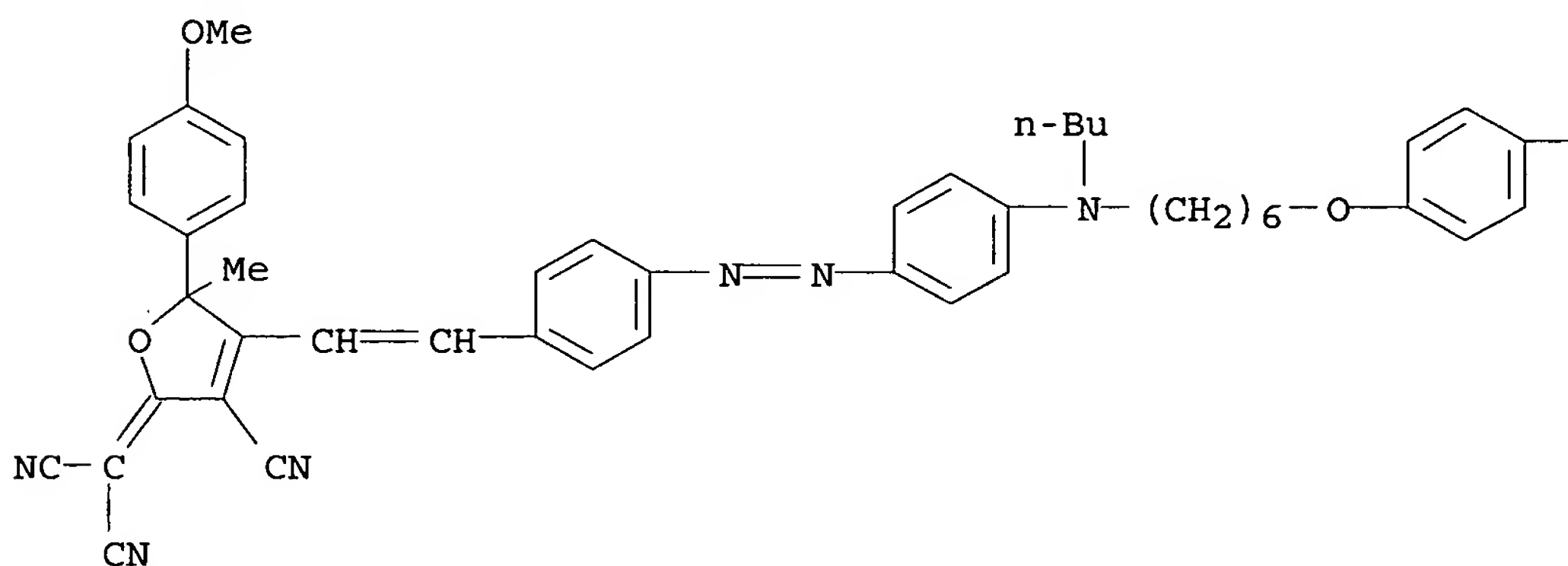
PAGE 3-A



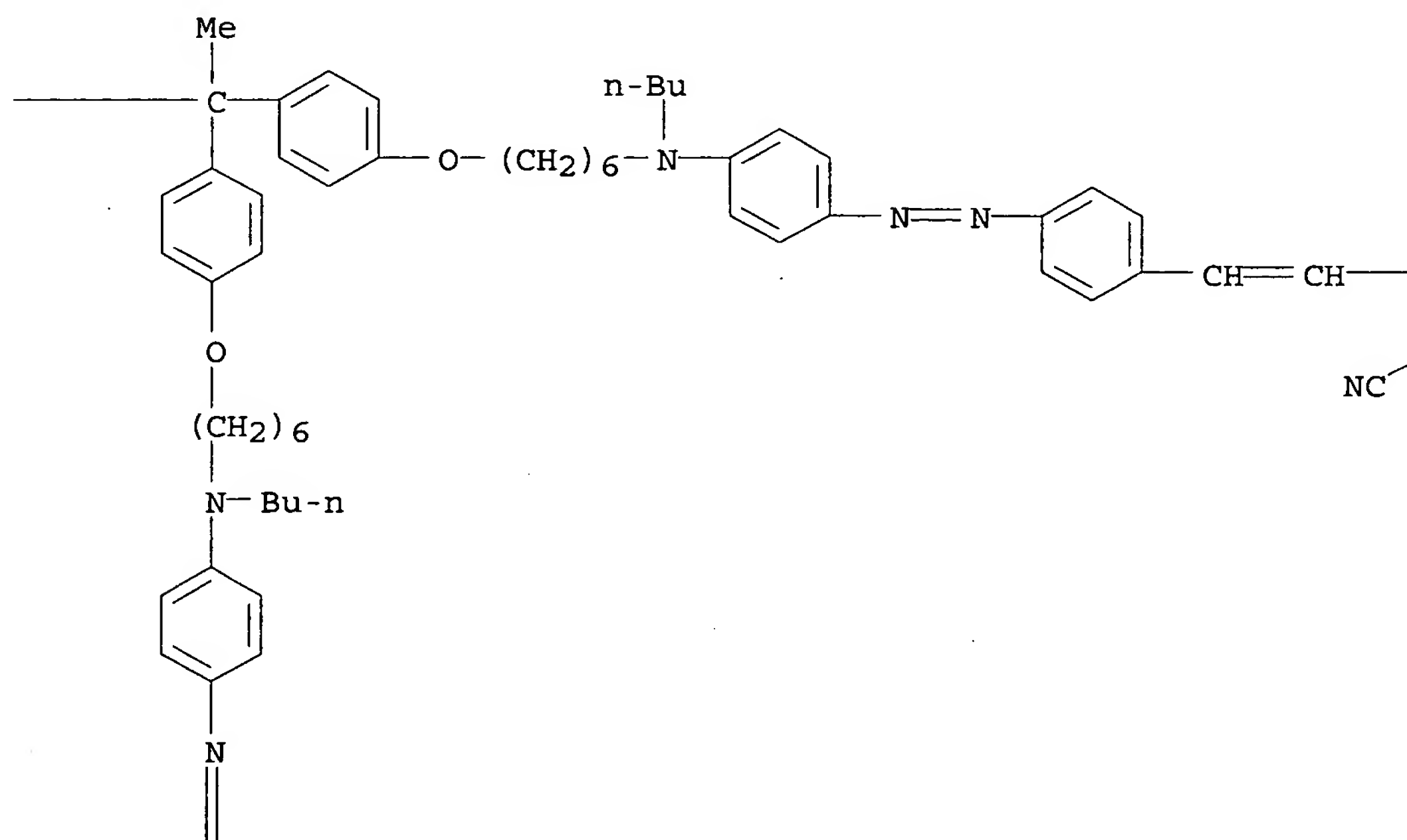
RN 639523-50-5 HCAPLUS

CN	Propanedinitrile, 2,2',2''-[ethylidynetris[4,1-phenyleneoxy-6,1-hexanediyl(butylimino)-4,1-phenyleneazo-4,1-phenylene-2,1-ethenediyl(3-cyano-5-(4-methoxyphenyl)-5-methyl-4-furanyl-2(5H)-ylidene)]]bis- (9CI) (CA INDEX NAME)
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PAGE 1-A



PAGE 1-B

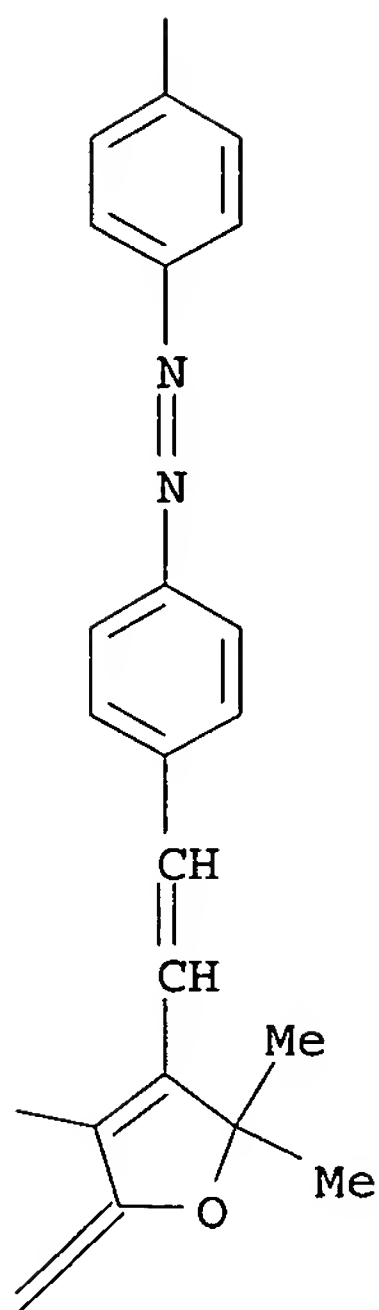


PAGE 2-A

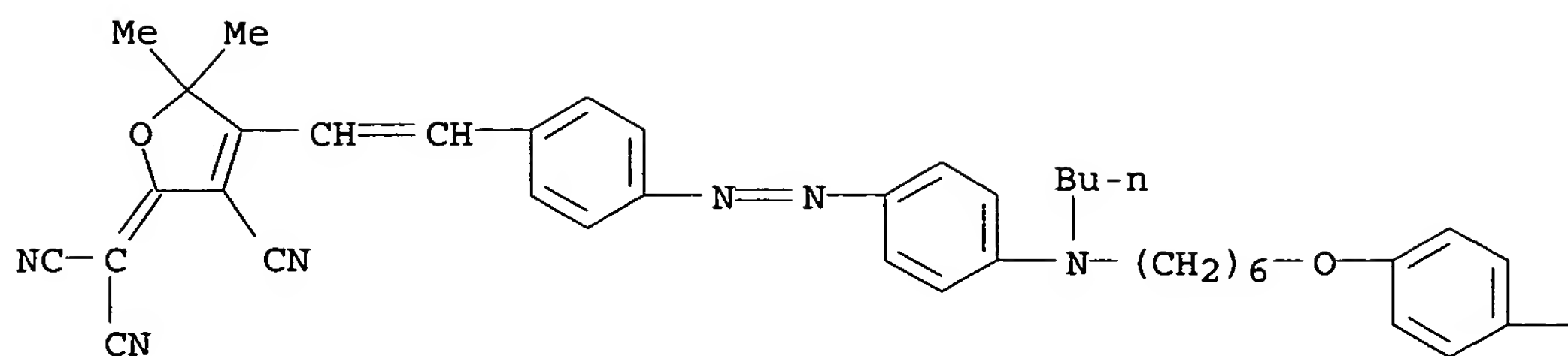
NC—

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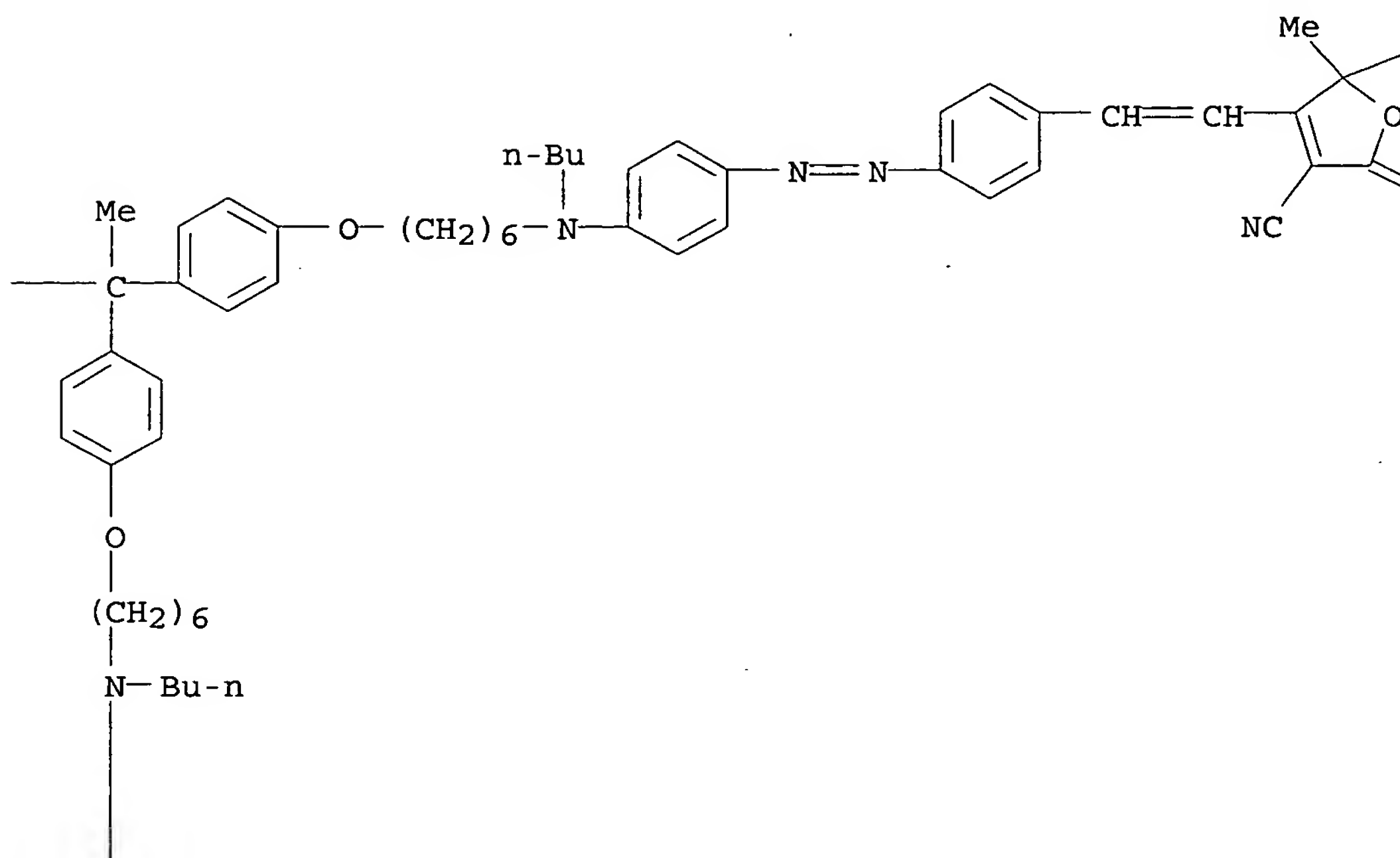
PAGE 2-B



PAGE 1-A

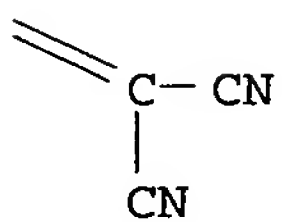


PAGE 1-B

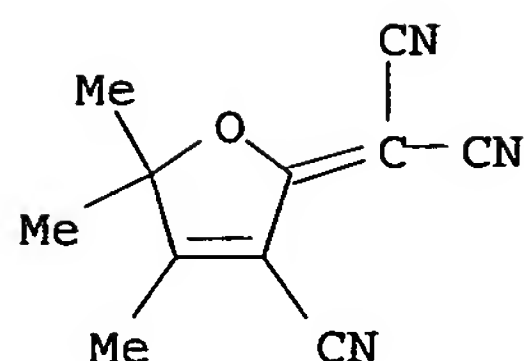


PAGE 1-C

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REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 24 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2004:61145 HCAPLUS

DOCUMENT NUMBER: 140:237116

TITLE: Star-shaped azo-based dipolar chromophores: design, synthesis, matrix compatibility, and electro-optic activity

AUTHOR(S): Gopalan, Padma; Katz, Howard E.; McGee, David J.; Erben, Chris; Zielinski, Thomas; Bousquet, Danielle; Muller, David; Grazul, John; Olsson, Ylva

CORPORATE SOURCE: Bell Laboratories, Lucent Technologies, Murray Hill, NJ, 07974, USA

SOURCE: Journal of the American Chemical Society (2004), 126(6), 1741-1747

CODEN: JACSAT; ISSN: 0002-7863

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Three new triphenylmethane trisazo dye push-pull chromophores with dendritic architecture were synthesized as active materials for electro-optic applications. These chromophores were synthesized in six or seven synthetic steps with an overall yield of around 80% per step and with high purity. UV-visible spectroscopy showed significant influence of the transient dipole moment on the observed  $r_{33}$  values. The chromophores were stable to photochem. oxidation in ambient light and air. The elec. poling conditions were optimized for each chromophore as the  $T_g$  of the composite material varied significantly. The highest EO coefficient achieved was 22-25 pm/V at 1550 nm wavelength. STEM anal. of the blends enabled the correlation of the activity of these large chromophores with the blend morphol. An amorphous polycarbonate host effectively disperses the chromophores in 2-20 nm aggregates in the active materials. However, macrophase separation into 200-500 nm aggregates was observed in a crosslinked methacrylate host matrix.

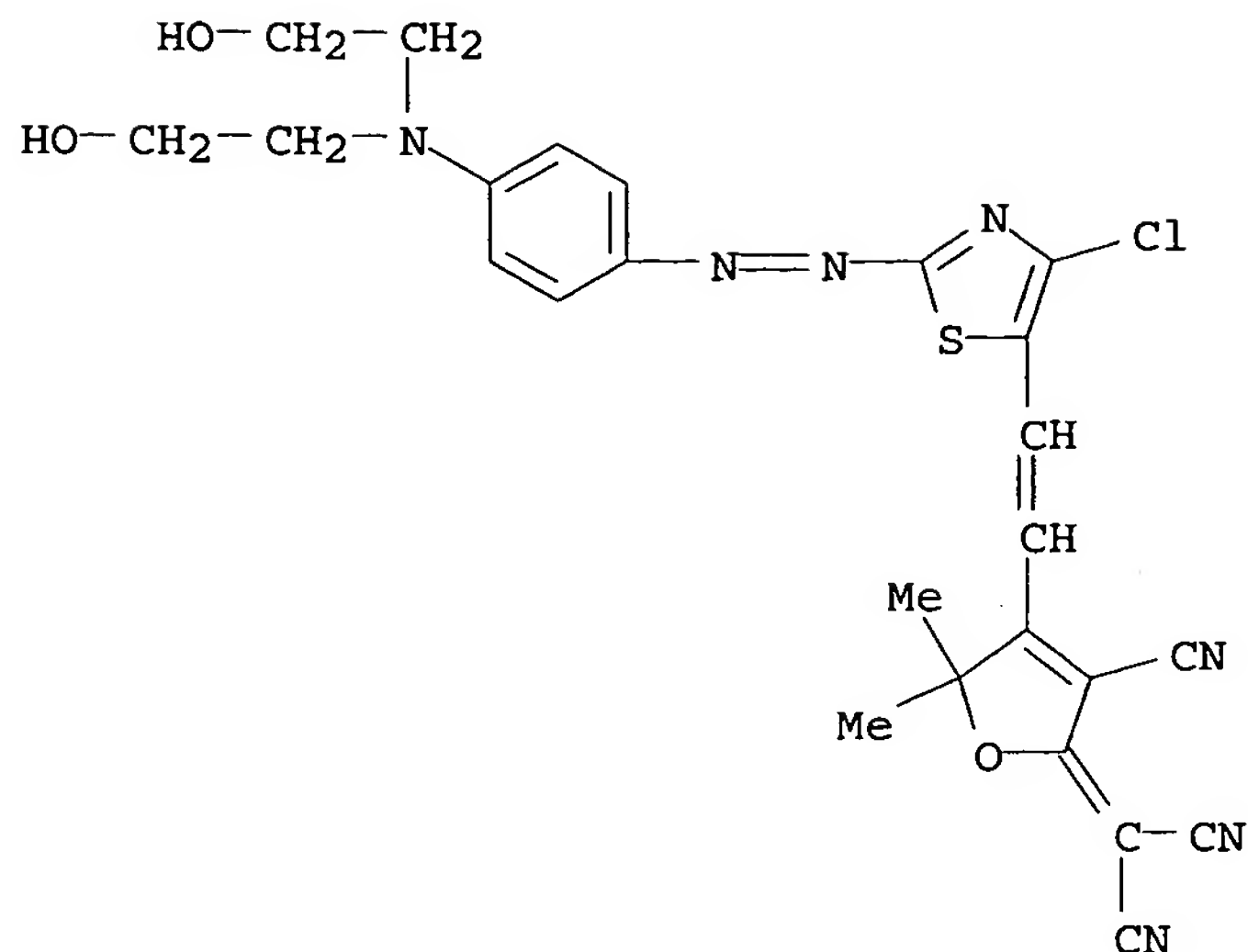
IT 639523-48-1P 639523-50-5P

RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(blue dye; preparation of triphenylmethane trisazo dyes for electrooptical NLO applications)

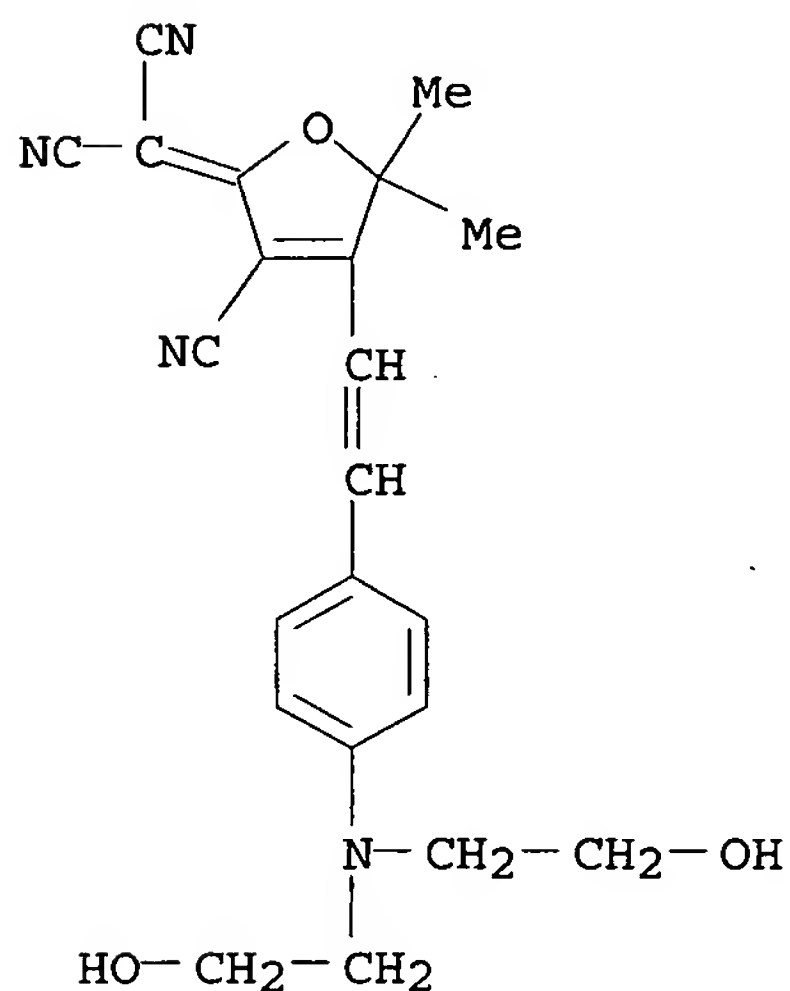
RN 639523-48-1 HCAPLUS

CN Propanedinitrile, 2,2',2''-[ethylidynetris[4,1-phenyleneoxy-6,1-hexanediyl(butylimino)-4,1-phenyleneazo-4,1-phenylene-2,1-ethenediyl(3-cyano-5,5-dimethyl-4-furanyl-2(5H)-ylidene)]]bis- (9CI) (CA INDEX NAME)



RN 716378-74-4 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



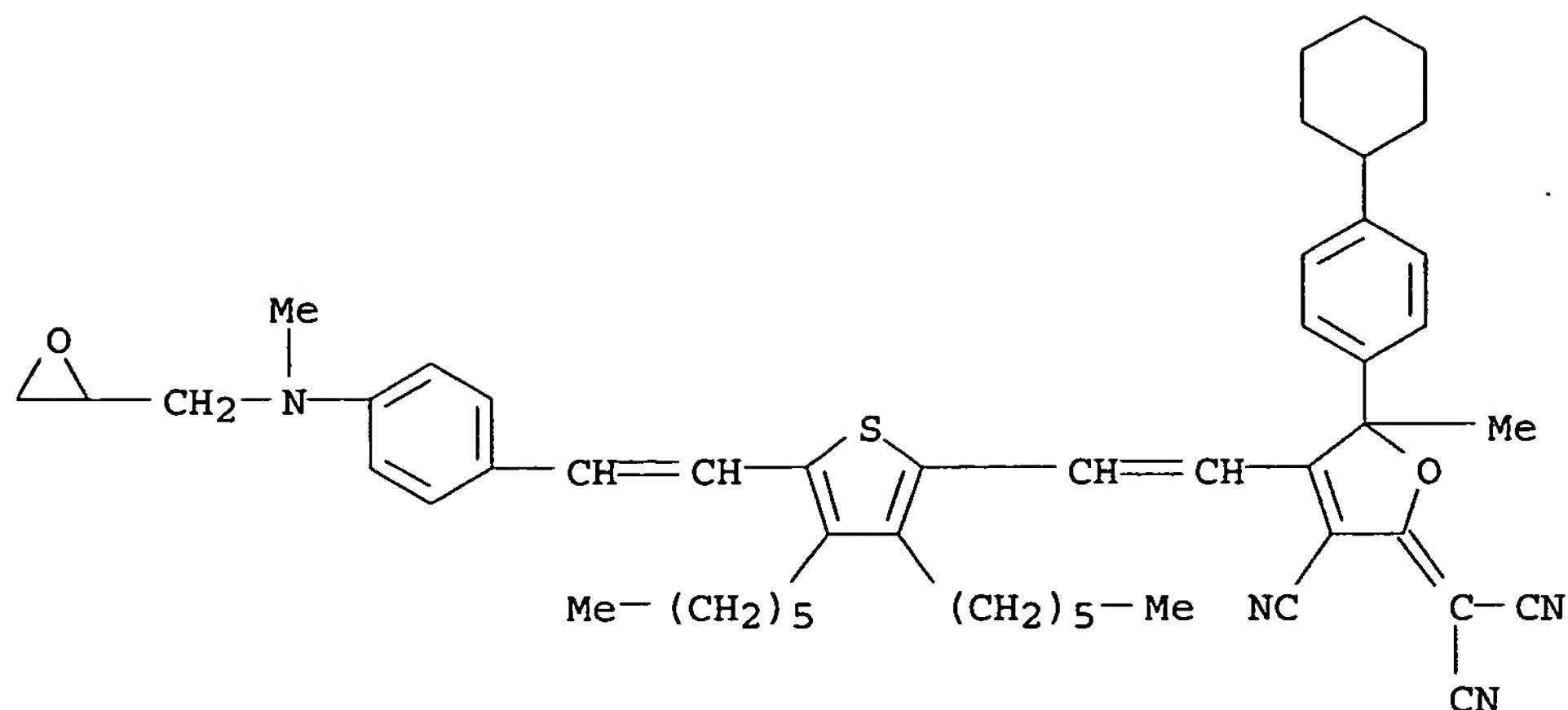
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(second-order NLO azo-based chromophores containing strong electron-withdrawing groups and different conjugated bridges)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)-(9CI) (CA INDEX NAME)



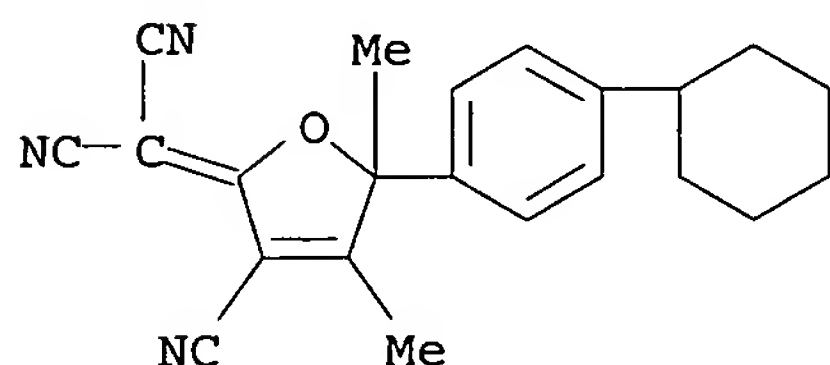
IT 383124-80-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(low loss electro-optic polymers and devices using them)

RN 383124-80-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



L8 ANSWER 31 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:850350 HCAPLUS

DOCUMENT NUMBER: 140:33381

TITLE: New materials for optical rectification and electrooptic sampling of ultrashort pulses in the terahertz regime

AUTHOR(S): Hayden, L. Michael; Sinyukov, Alexander M.; Leahy, Megan R.; French, Joey; Lindahl, Peter; Herman, Warren N.; Twieg, Robert J.; He, Meng

CORPORATE SOURCE: Department of Physics, University of Maryland  
Baltimore County, Baltimore, MD, 21250, USASOURCE: Journal of Polymer Science, Part B: Polymer Physics  
(2003), 41(21), 2492-2500  
CODEN: JPBPEM; ISSN: 0887-6266

PUBLISHER: John Wiley &amp; Sons, Inc.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The synthesis and nonlinear optical characterization of new electrooptic (EO) materials useful for terahertz (THz) applications is presented. Semiempirical calcns. were used to guide the development of a series of chromophores on the basis of 2-dicyanomethylen-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran acceptors acting as guests in polymer films used in the generation of THz radiation via optical rectification. Amorphous films,

65-250  $\mu\text{m}$  thick, with EO coeffs. as high as 52 pm/V at 785 nm were used to generate sub-picosecond pulses with bandwidths up to 3 THz.

IT 296280-34-7 402490-54-4 634202-67-8

634202-68-9 634202-69-0 634202-70-3

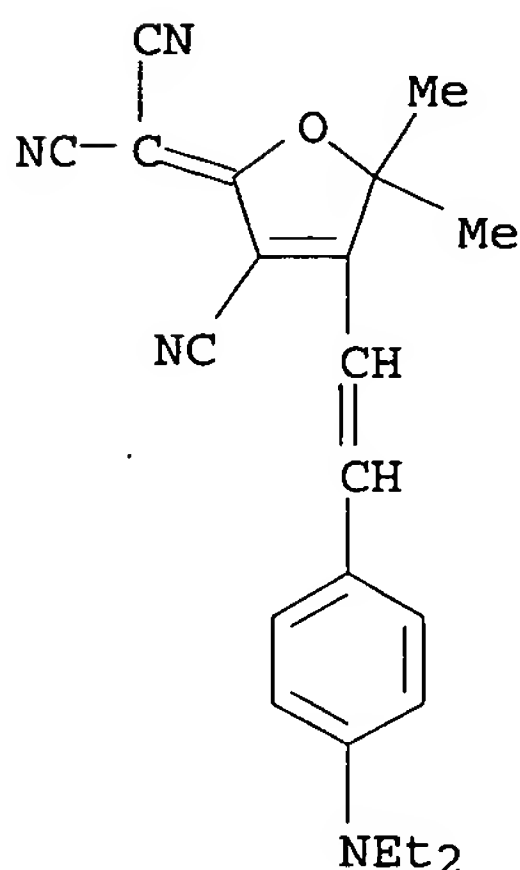
634202-71-4 634202-72-5 634202-73-6

RL: MOA (Modifier or additive use); USES (Uses)

(chromophore-polycarbonate composites for optical rectification and electrooptic sampling of ultrashort pulses in terahertz regime)

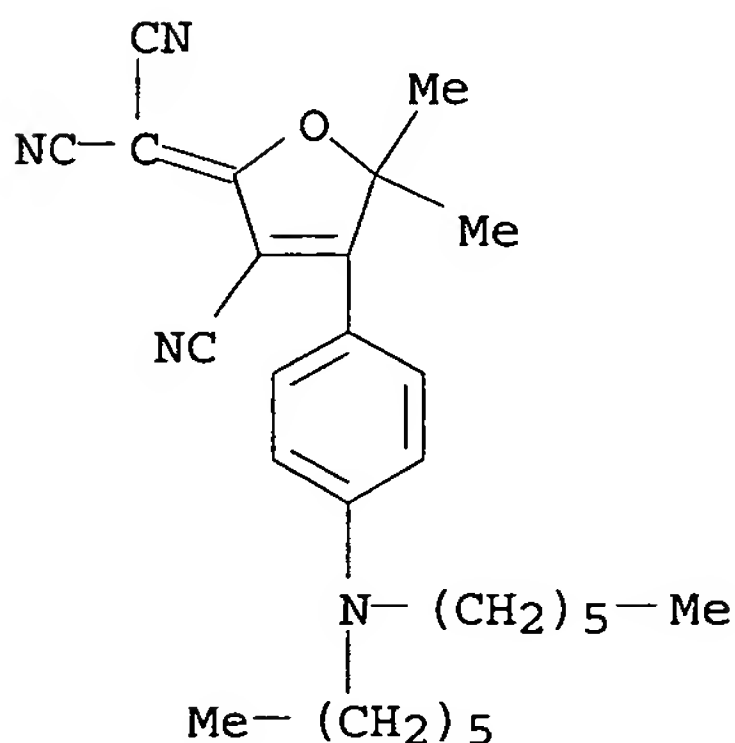
RN 296280-34-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



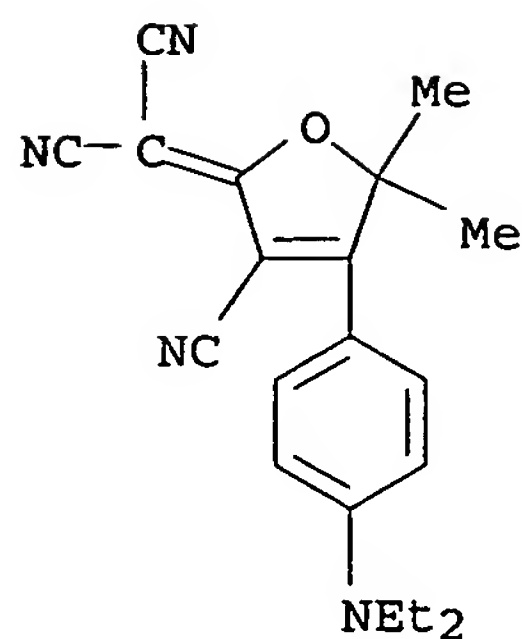
RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



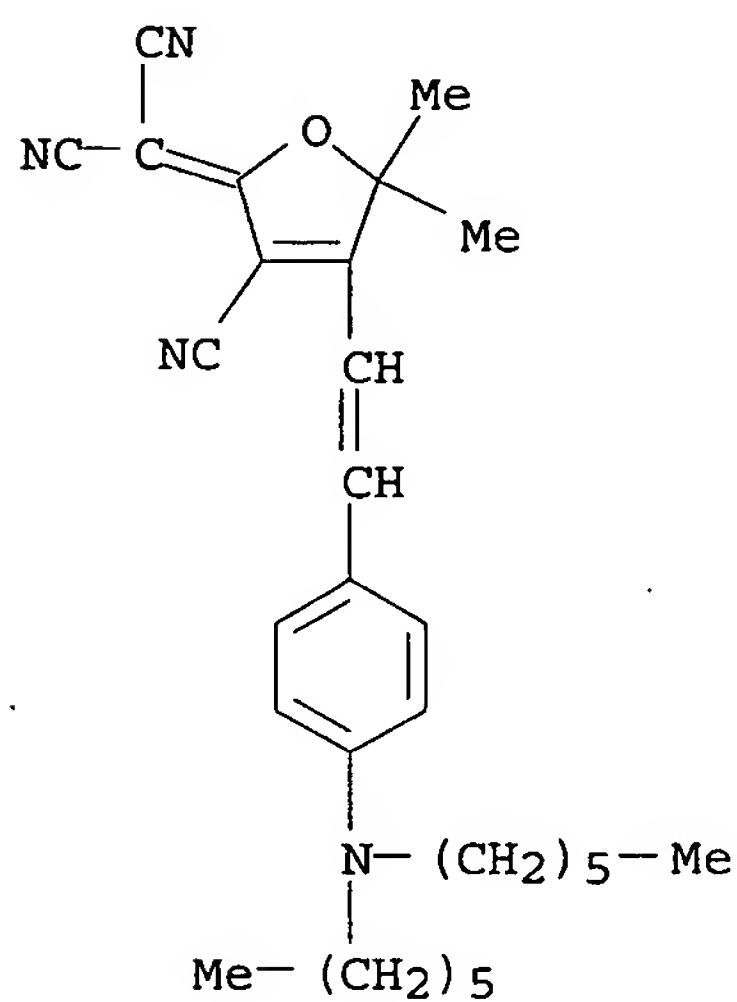
RN 634202-67-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(diethylamino)phenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



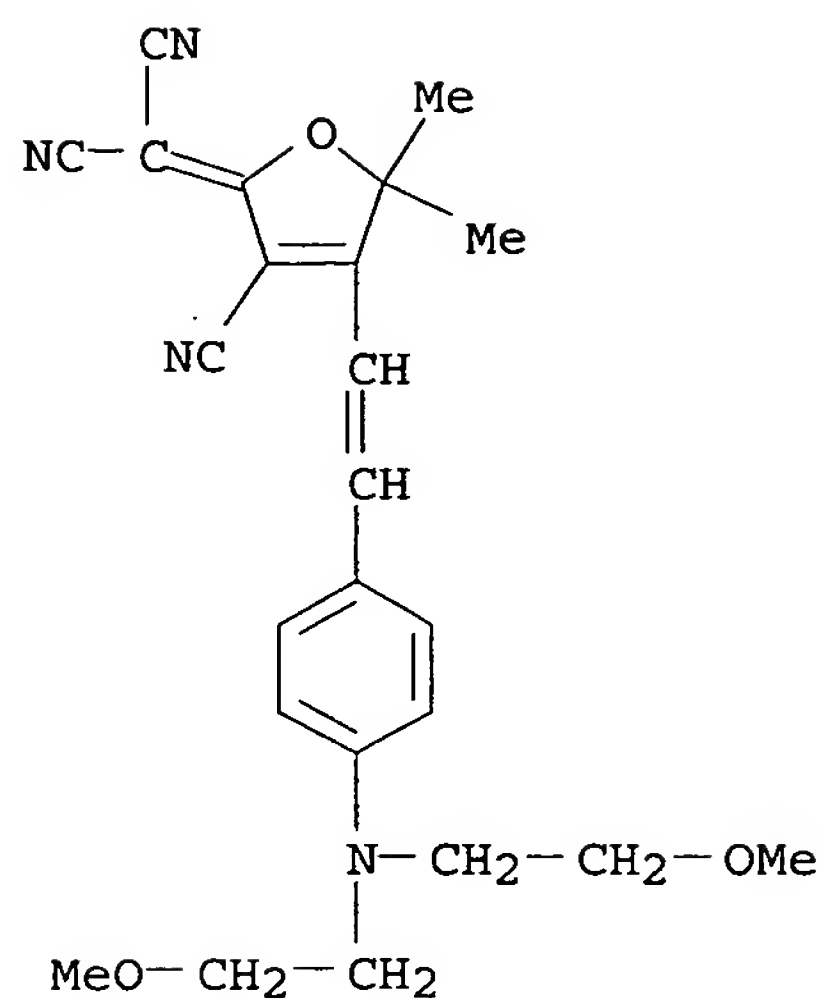
RN 634202-68-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



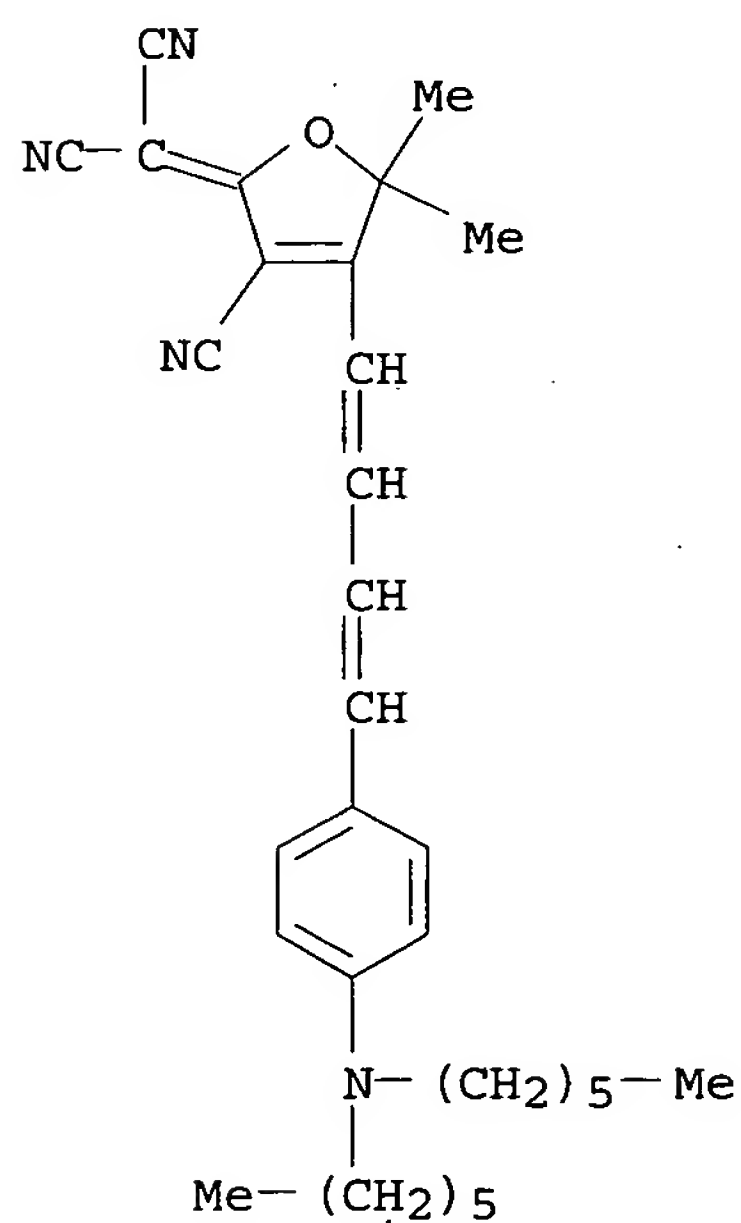
RN 634202-69-0 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



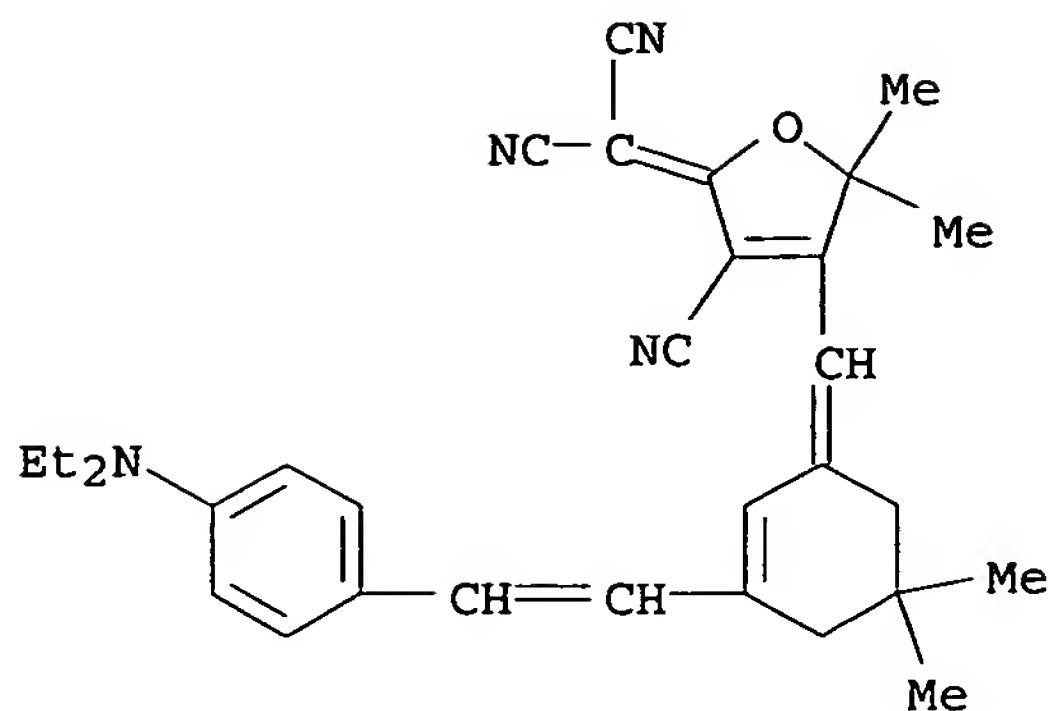
RN 634202-70-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-[4-(dihexylamino)phenyl]-1,3-butadienyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



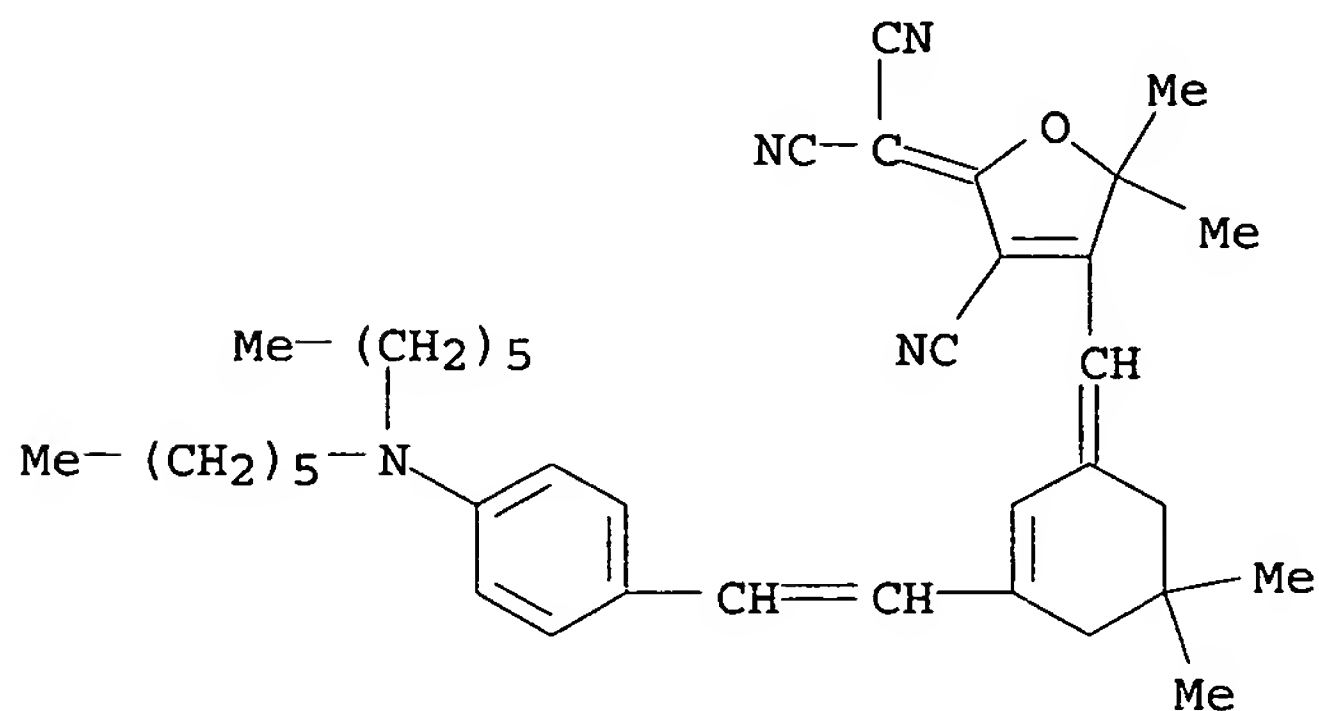
RN 634202-71-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]methyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



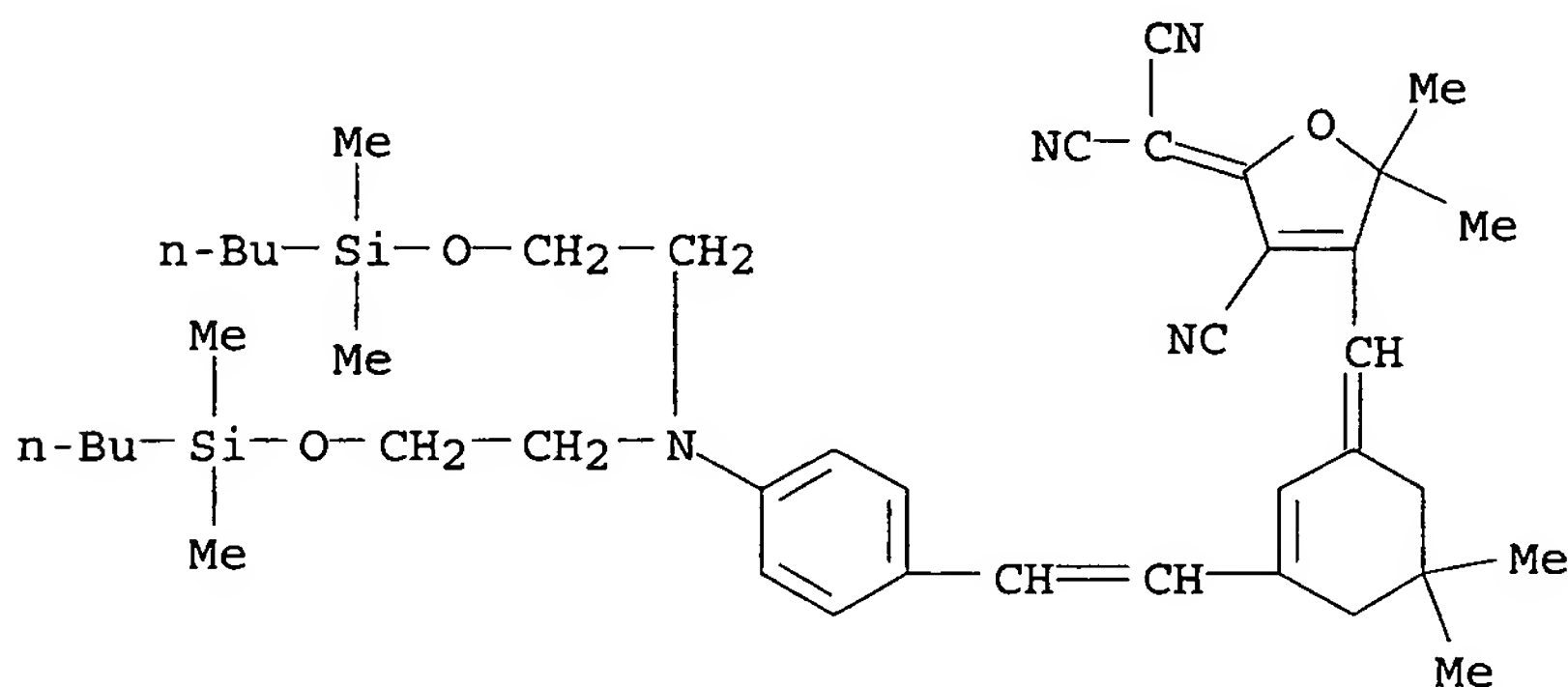
RN 634202-72-5 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]methyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



RN 634202-73-6 HCAPLUS

CN Propanedinitrile, [4-[[3-[2-[4-[bis[2-[(butyldimethylsilyl)oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]methyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT:

39

THERE ARE 39 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT.

L8 ANSWER 32 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:801303 HCAPLUS

DOCUMENT NUMBER: 140:17234

TITLE: Novel chromophore-functionalized poly[2-(trifluoromethyl)adamantyl acrylate-methyl vinyl urethane]s with high poling stabilities of the nonlinear optical effect

AUTHOR(S): Briers, David; Koeckelberghs, Guy; Picard, Isabel; Verbiest, Thierry; Persoons, Andre; Samyn, Celest

CORPORATE SOURCE: Laboratory of Macromolecular and Physical Organic Chemistry, Katholieke Universiteit Leuven, Heverlee, 3001, Belg.

SOURCE: Macromolecular Rapid Communications (2003), 24(14), 841-846

CODEN: MRCOE3; ISSN: 1022-1336

PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Nonlinear optical vinyl polymers with high glass transition temperature (T<sub>g</sub>) were prepared by the functionalization of a fluorinated acrylate-Me vinyl isocyanate copolymer. A modified pathway to obtain a thiophene bridged chromophore was worked out. Poled films of the polymers show a fairly high and stable nonlinear optical response, even at elevated temps.

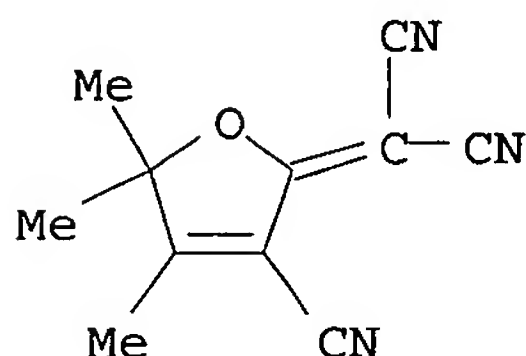
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(in preps. of thiophene-bridged chromophore mols. for synthesis of adamantyl- and urethane-bearing acrylate polymers having nonlinear optical effects)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



IT 629649-92-9P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

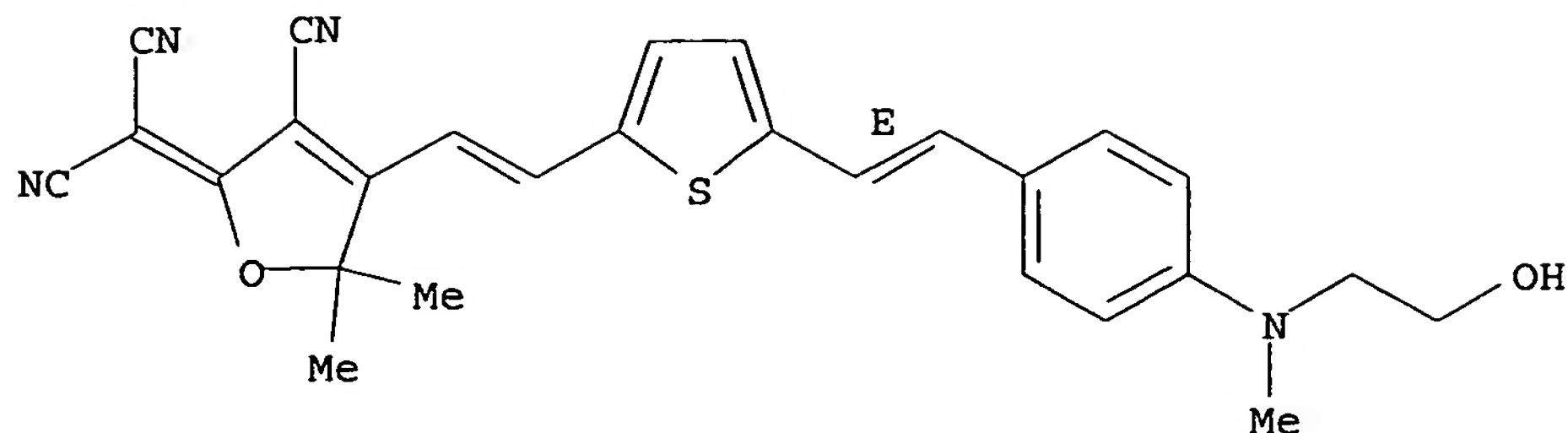
(in preps. of thiophene-bridged chromophore mols. for synthesis of adamantyl- and urethane-bearing acrylate polymers having nonlinear optical effects)

RN 629649-92-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[(1E)-2-[4-[(2-hydroxyethyl)methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

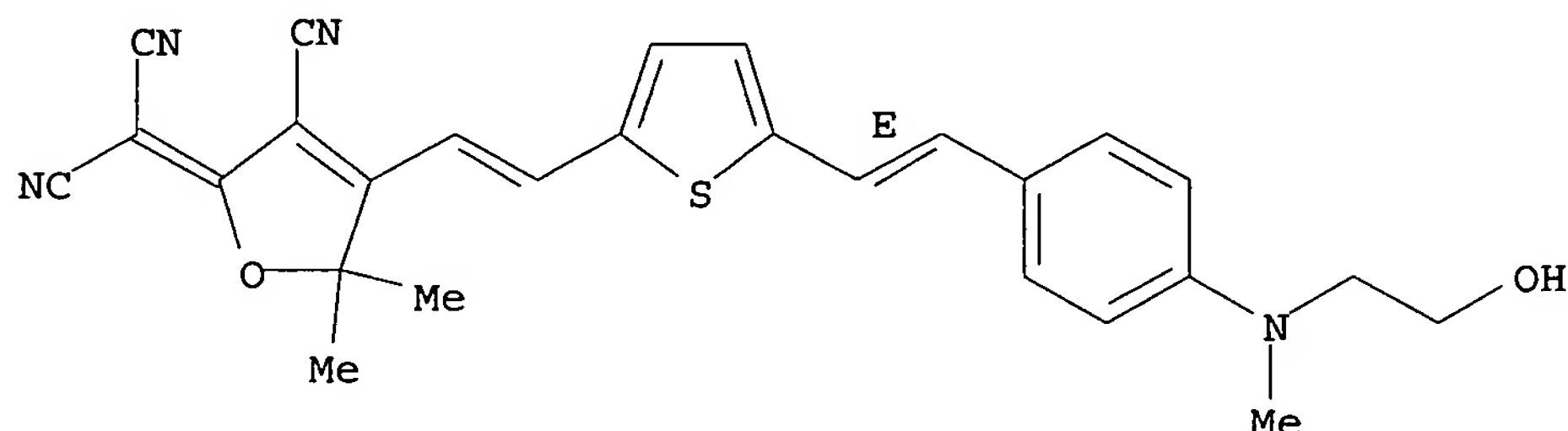
Double bond geometry as described by E or Z.





IT 629649-92-9DP, reaction product with adamantyl- and isocyanate-bearing polyacrylates and alcs.  
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (synthesis of chromophore-functionalized adamantyl- and urethane-bearing acrylate polymers having nonlinear optical effects)  
 RN 629649-92-9 HCAPLUS  
 CN Propanedinitrile, [3-cyano-4-[2-[5-[(1E)-2-[4-[(2-hydroxyethyl)methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as described by E or Z.



REFERENCE COUNT: 31 THERE ARE 31 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 33 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2003:756534 HCAPLUS  
 DOCUMENT NUMBER: 140:34537  
 TITLE: Focused microwave-assisted synthesis of 2,5-dihydrofuran derivatives as electron acceptors for highly efficient nonlinear optical chromophores  
 AUTHOR(S): Liu, Sen; Haller, Marnie A.; Luo, Jingdong; Jang, Sei-Hum; Ma, Hong; Dalton, Larry R.; Jen, Alex K.-Y.  
 CORPORATE SOURCE: Departments of Materials Science and Engineering and Chemistry, University of Washington, Seattle, WA, 98195, USA  
 SOURCE: Materials Research Society Symposium Proceedings (2003), 771(Organic and Polymeric Materials and Devices), 375-380  
 CODEN: MRSPDH; ISSN: 0272-9172  
 PUBLISHER: Materials Research Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB A diversified family of 2,5-dihydrofuran derivs. has been synthesized as a new class of highly efficient and tunable electron acceptors using the single-mode focused microwave irradiation High poling efficiency and very

large electro-optic coeffs. ( $r_{33}$  values of 128 and 116 pm/V at 1.3  $\mu\text{m}$ ) have been demonstrated using 2-dicyanomethylene-3-cyano-4,5-dimethyl-5-trifluoromethyl-2,5-dihydrofuran (CF<sub>3</sub>-TCF)-based chromophores as dopant in poly(Me methacrylate) (PMMA) and a high glass-transition temperature polyquinoline (PQ-100) resp. Films were doped with [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile. Excellent dipole alignment stability has also been demonstrated in the guest/host composite at 85°C. Multi-functionalized NLO chromophores based on hydroxy containing 2,5-dihydrofuran acceptors were also synthesized through microwave methodol. for further characterizations.

IT 613237-39-1, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile 613237-40-4, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]propanedinitrile 613237-41-5, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile 613237-42-6, [3-Cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile 634195-67-8 634195-68-9

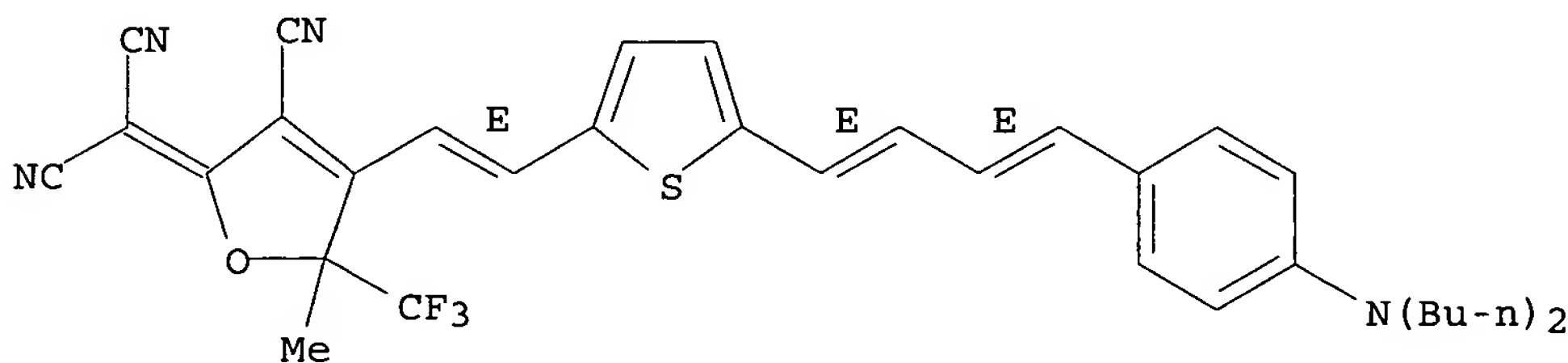
RL: PRP (Properties)

(focused microwave-assisted synthesis of dihydrofuran derivs. as electron acceptors for highly efficient nonlinear optical chromophores)

RN 613237-39-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

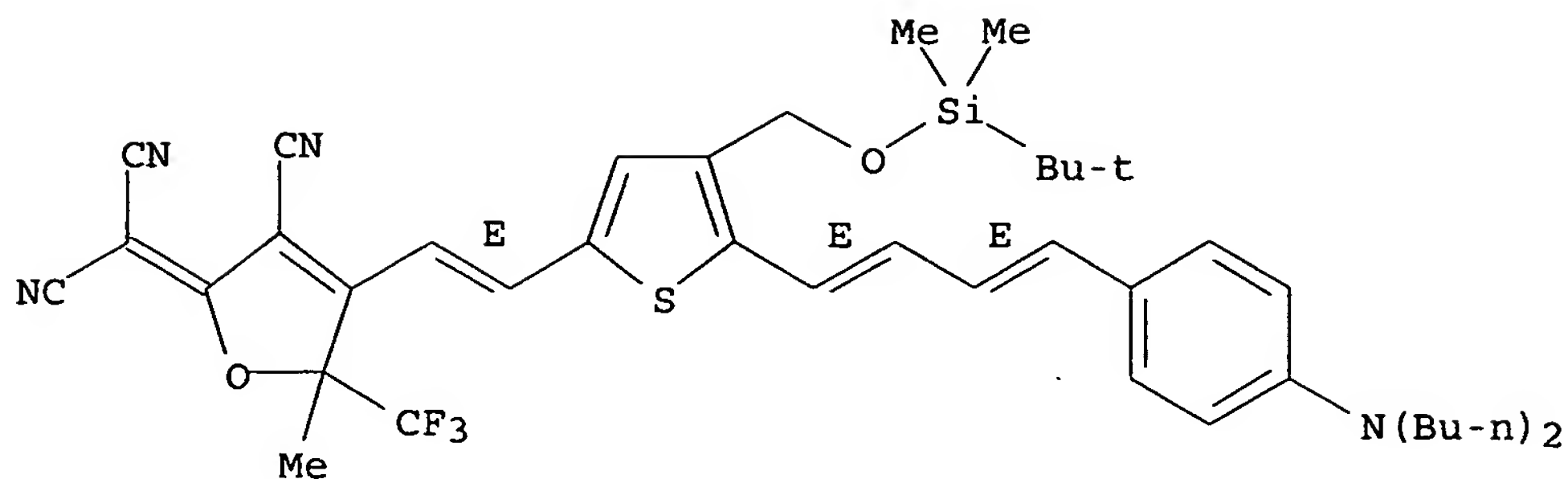
Double bond geometry as shown.



RN 613237-40-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

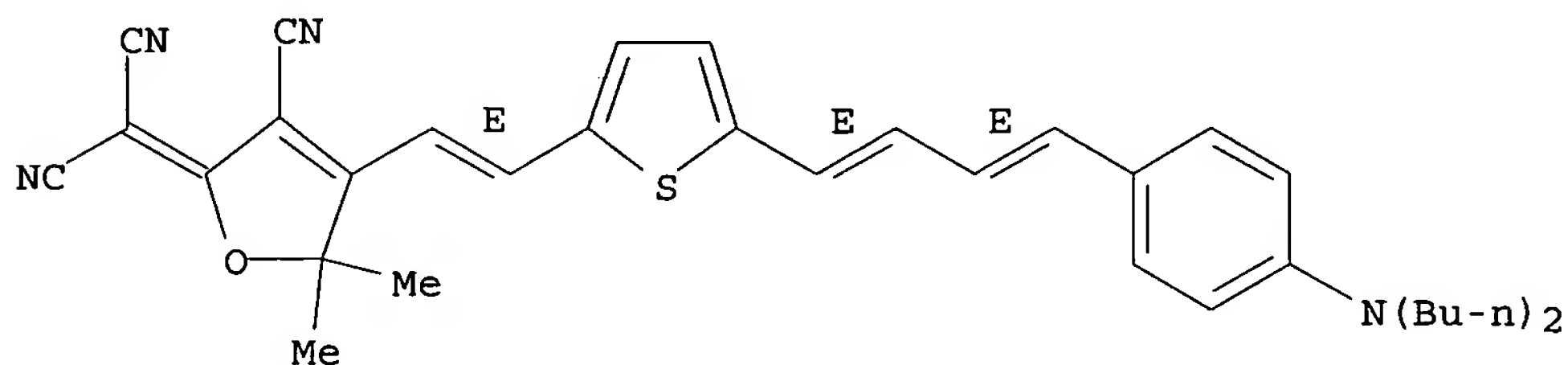
Double bond geometry as shown.



RN 613237-41-5 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

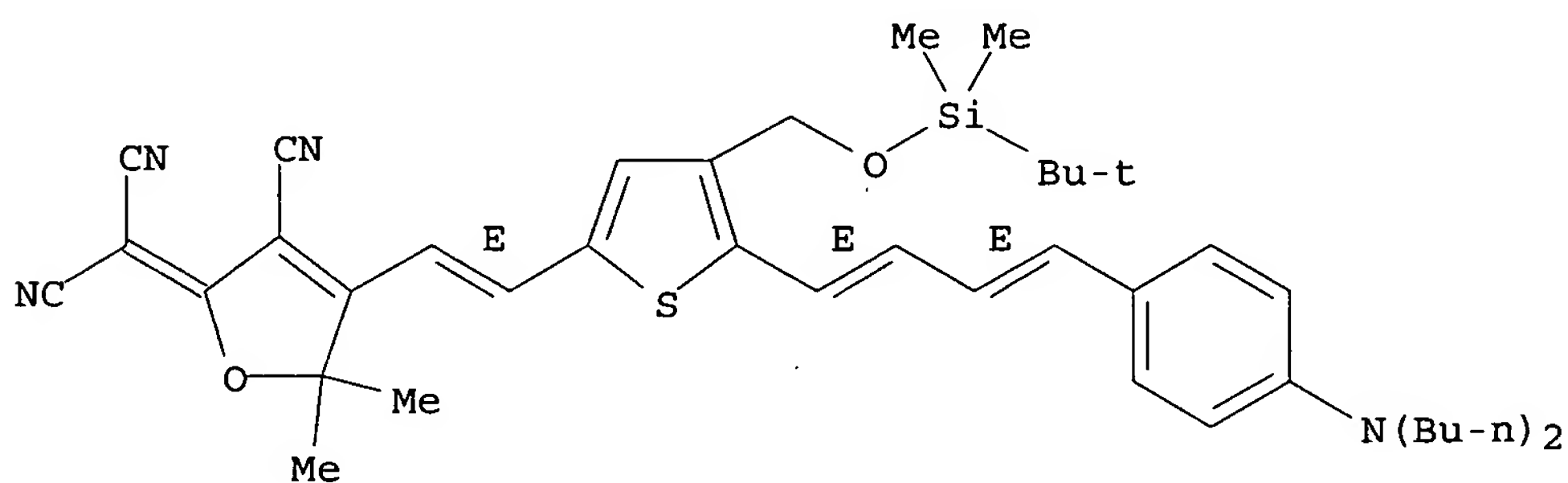
Double bond geometry as shown.



RN 613237-42-6 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

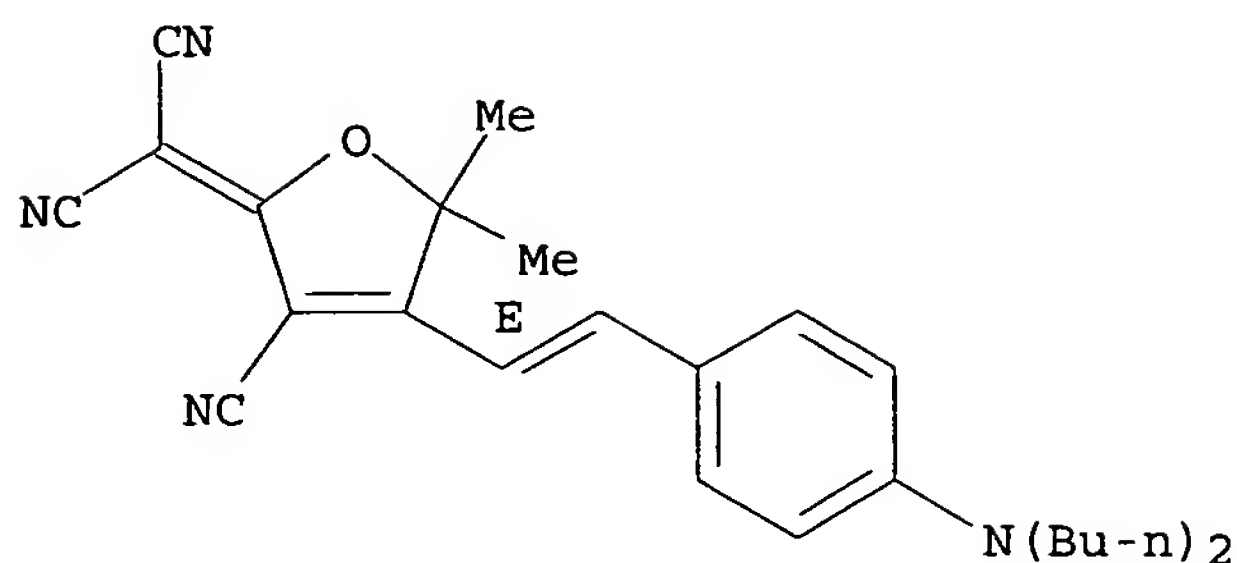
Double bond geometry as shown.



RN 634195-67-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-(dibutylamino)phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

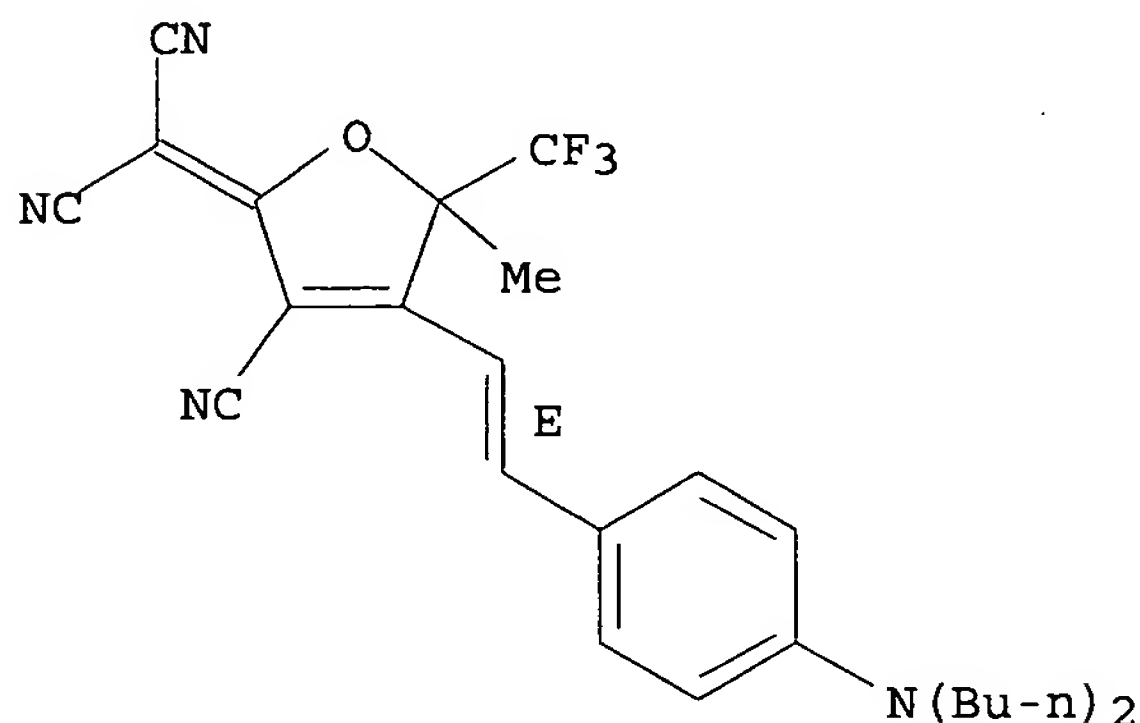
Double bond geometry as shown.



RN 634195-68-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-(dibutylamino)phenyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 34 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:753428 HCAPLUS

DOCUMENT NUMBER: 139:377422

TITLE: Vibrational Stark effects calibrate the sensitivity of vibrational probes for electric fields in proteins

AUTHOR(S): Suydam, Ian T.; Boxer, Steven G.

CORPORATE SOURCE: Department of Chemistry, Stanford University, Stanford, CA, 94305-5080, USA

SOURCE: Biochemistry (2003), 42(41), 12050-12055  
CODEN: BICHAW; ISSN: 0006-2960

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB IR spectroscopy is widely used to probe local environments and dynamics in proteins. The introduction of a unique vibration at a specific site of a protein or more complex assembly offers many advantages over observing the spectra of an unmodified protein. We have previously shown that IR frequency shifts in proteins can arise from differences in the local elec. field at the probe vibration. Thus, vibrational frequencies can be used to map elec. fields in proteins at many sites or to measure the change in elec. field due to a perturbation. The Stark tuning rate gives the sensitivity of a vibrational frequency to an elec. field, and for it to be useful, the Stark tuning rate should be as large as possible. Vibrational

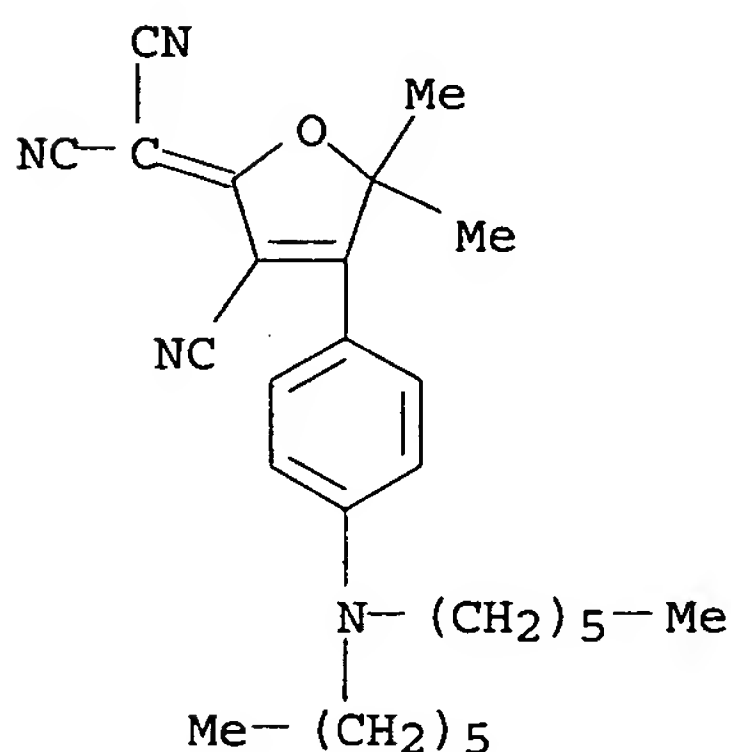
Stark effect spectroscopy provides a direct measurement of the Stark tuning rate and allows a quant. interpretation of frequency shifts. We present vibrational Stark spectra of several bond types, extending our work on nitriles and carbonyls and characterizing four addnl. bond types (carbon-fluorine, carbon-deuterium, azide, and nitro bonds) that are potential probes for elec. fields in proteins. The measured Stark tuning rates, peak positions, and extinction coeffs. provide the primary information needed to design amino acid analogs or labels to act as probes of local environments in proteins.

IT 402490-54-4

RL: ARU (Analytical role, unclassified); ANST (Analytical study)  
(vibrational Stark effects calibrate the sensitivity of vibrational probes for elec. Fields in proteins)

RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 32 THERE ARE 32 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 35 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:707777 HCAPLUS

DOCUMENT NUMBER: 139:237438

TITLE: Sterically stabilized second-order nonlinear optical chromophores with improved stability and devices incorporating the same

INVENTOR(S): Zhang, Cheng; Fetterman, Harold R.; Steier, William; Michael, Joseph

PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA

SOURCE: U.S., 29 pp., Cont.-in-part of U.S. 6,361,717.

CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 10

PATENT INFORMATION:

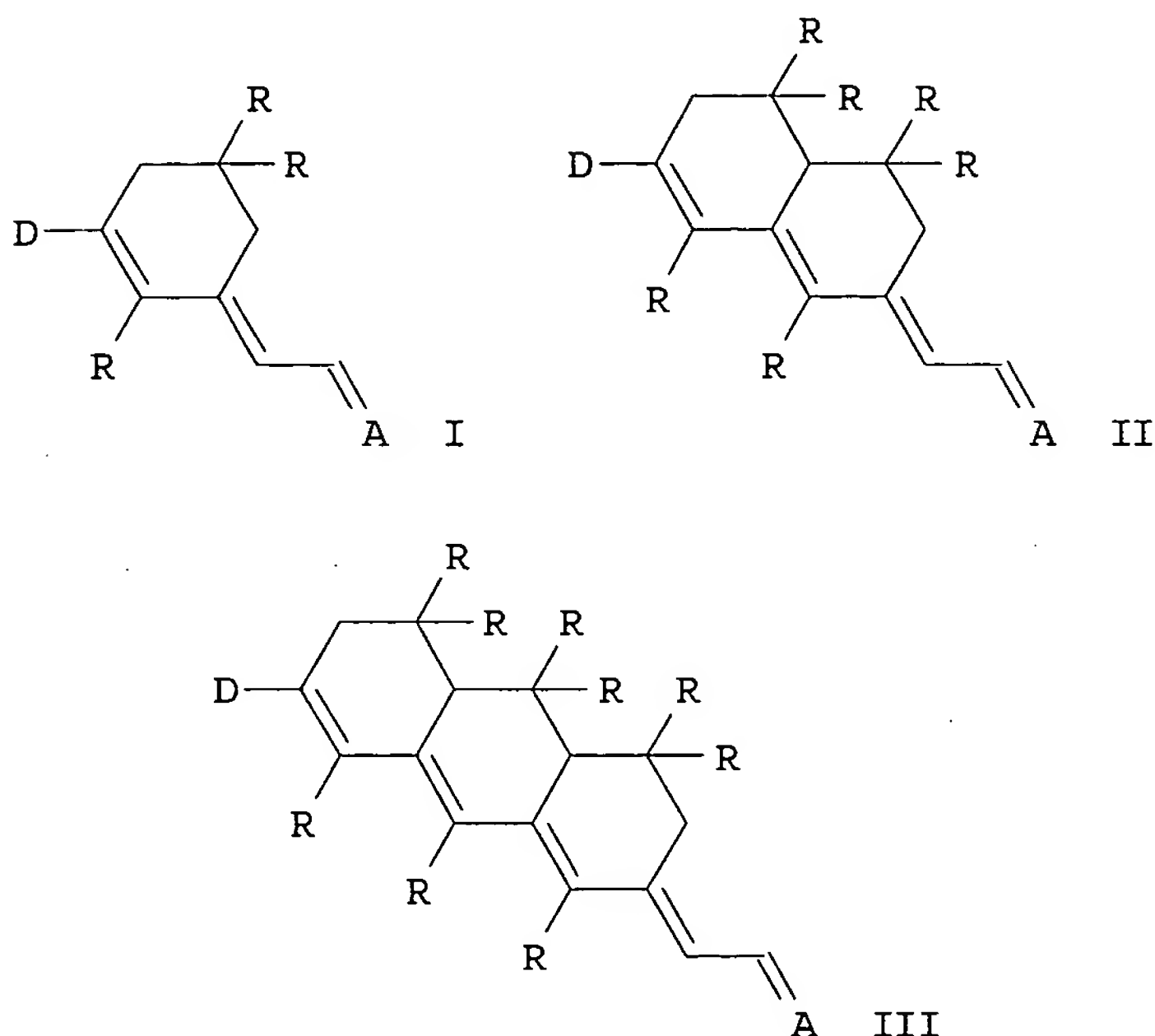
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6616865	B1	20030909	US 2000-546930	20000411
US 6067186	A	20000523	US 1998-122806	19980727
US 6361717	B1	20020326	US 2000-488422	20000120
US 6348992	B1	20020219	US 2000-551685	20000418
US 6652779	B1	20031125	US 2000-679937	20001005

WO 2001077749 A1 20011018 WO 2001-US11613 20010409  
 W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN,  
 CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR,  
 HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT,  
 LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU,  
 SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU,  
 ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM  
 RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,  
 DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF,  
 BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG  
 US 2002027220 A1 20020307 US 2001-898625 20010703  
 US 6555027 B2 20030429

PRIORITY APPLN. INFO.:

US 1998-122806 A2 19980727  
 US 2000-488422 A2 20000120  
 US 2000-546930 A2 20000411  
 US 2000-551685 A2 20000418

OTHER SOURCE(S): MARPAT 139:237438  
 GI



AB A nonlinear optical device is described comprising an active element including a sterically stabilized 2nd-order chromophore units according to I,II and III wherein D is an electron donor group; wherein A is an electron acceptor group; wherein R = H, F, or any perhalogenated, halogenated or non-halogenated aliphatic or aromatic group with 1-30 carbon atoms functionalized with zero or more of the following functional groups: hydroxy, ether, ester, amino, silyl, and siloxy, and R groups at different positions are not necessarily the same.

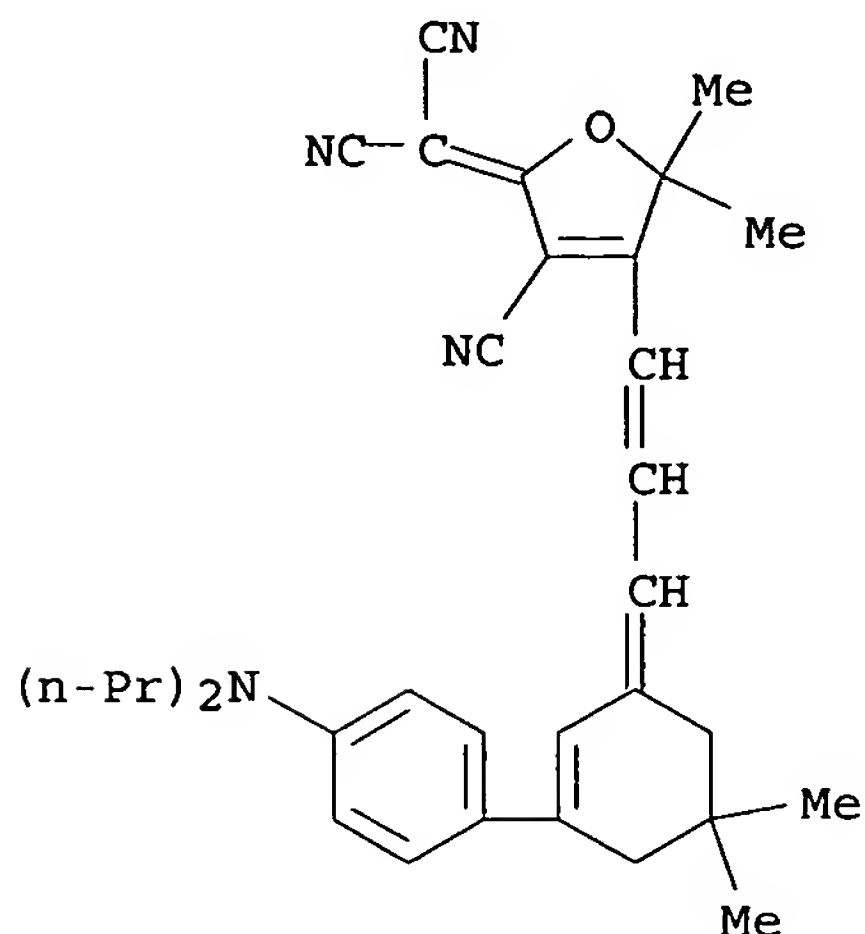
IT 595567-18-3 595567-19-4D, derivs. 595567-20-7  
 595567-21-8 595567-22-9 595567-23-0D, derivs.  
 595567-24-1 595567-25-2 595567-26-3

RL: DEV (Device component use); USES (Uses)

(chromophore; sterically stabilized second-order nonlinear optical chromophores with improved stability and devices incorporating them)

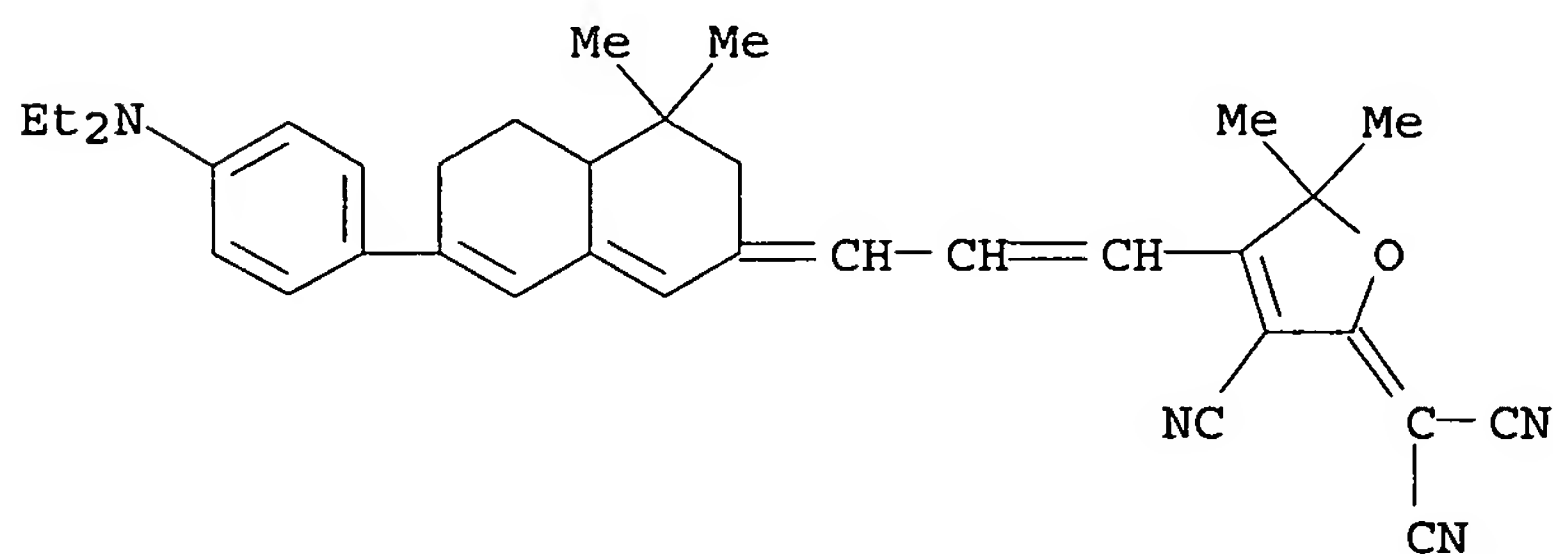
RN 595567-18-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[4-(dipropylamino)phenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



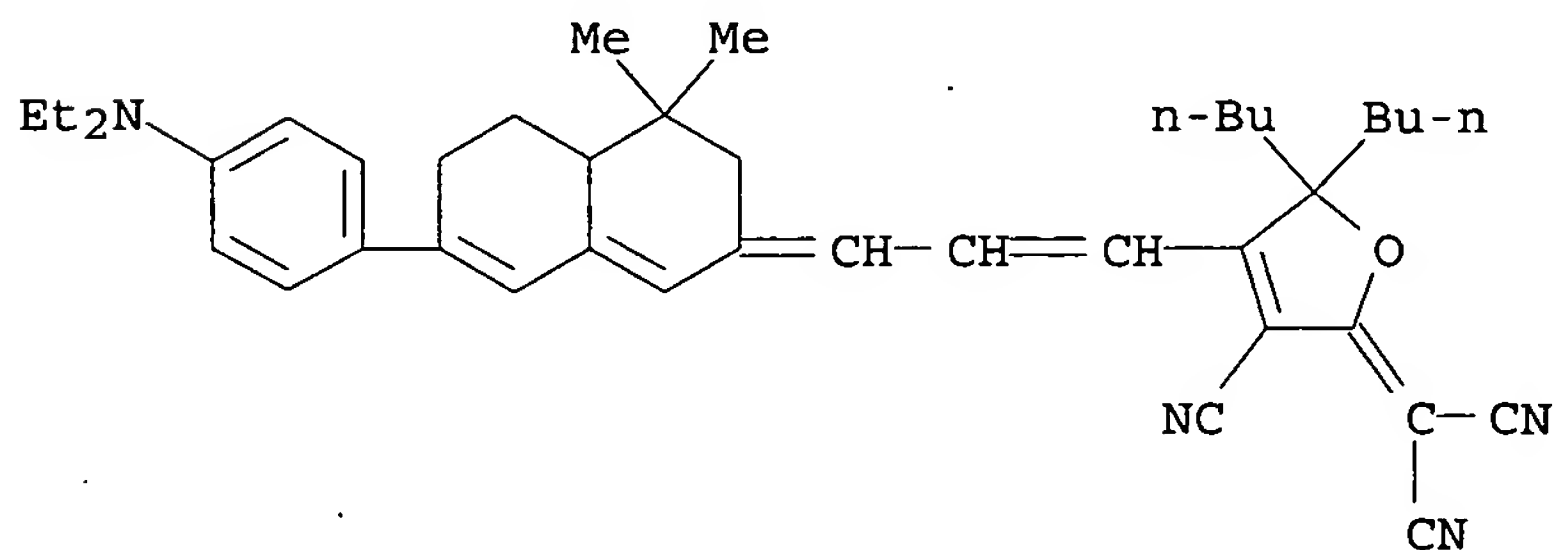
RN 595567-19-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[7-[4-(diethylamino)phenyl]-4,4a,5,6-tetrahydro-4,4-dimethyl-2(3H)-naphthalenylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



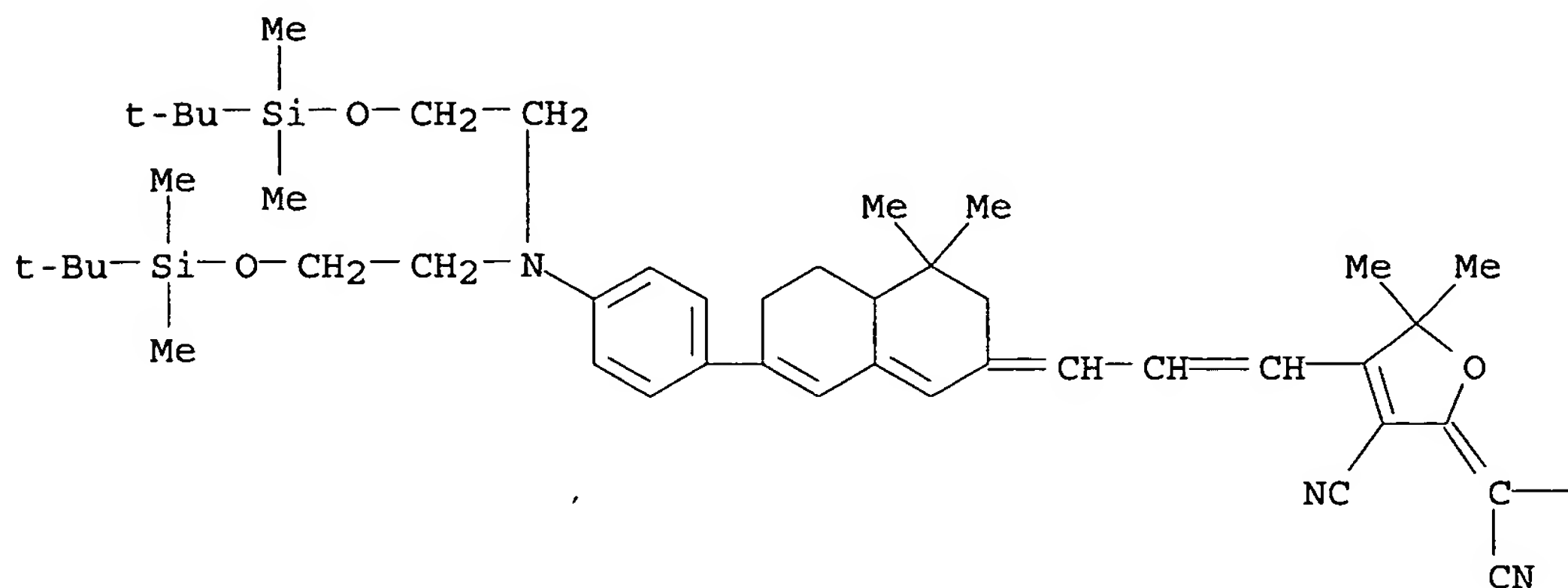
RN 595567-20-7 HCAPLUS

CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[7-[4-(diethylamino)phenyl]-4,4a,5,6-tetrahydro-4,4-dimethyl-2(3H)-naphthalenylidene]-1-propenyl]-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 595567-21-8 HCAPLUS  
 CN Propanedinitrile, [4-[3-[7-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]-4,4a,5,6-tetrahydro-4,4-dimethyl-2(3H)-naphthalenylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

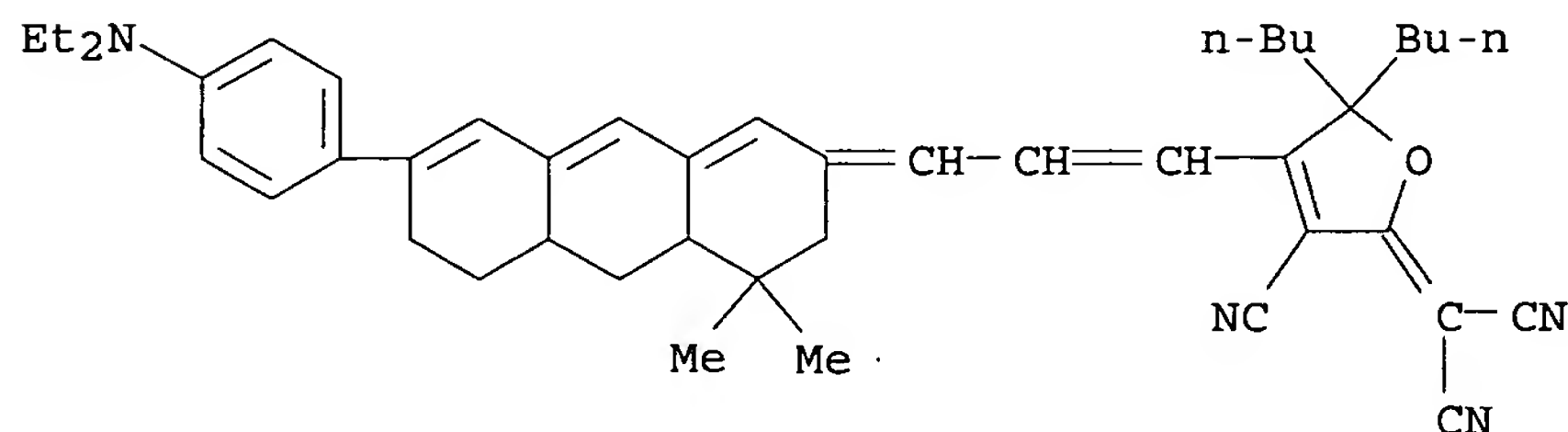
PAGE 1-A



PAGE 1-B

— CN

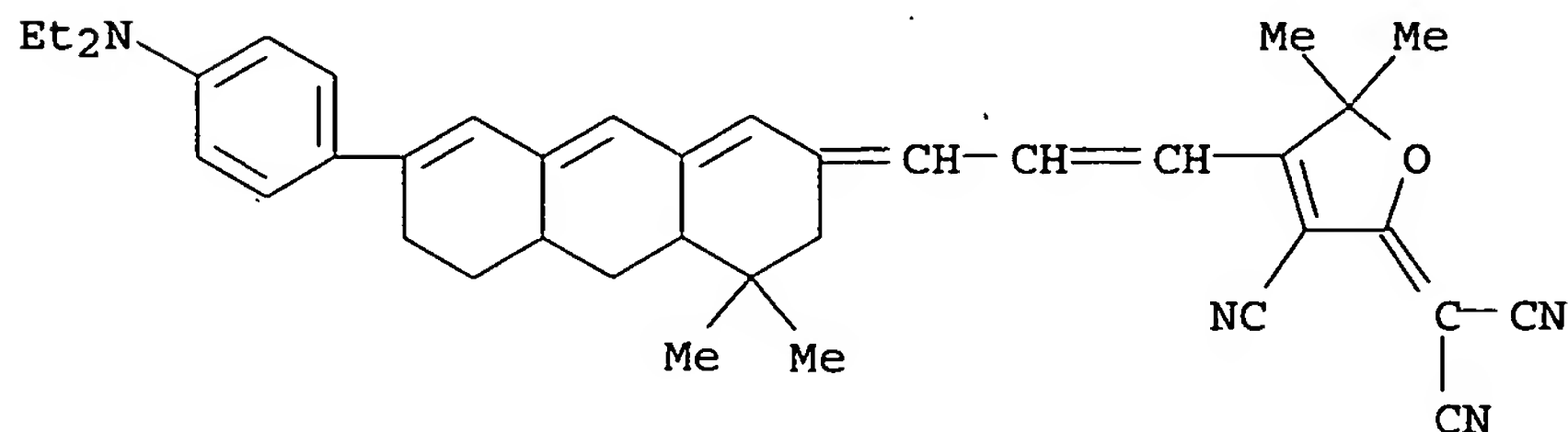
RN 595567-22-9 HCAPLUS  
 CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[7-[4-(diethylamino)phenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]-1-propenyl]-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 595567-23-0 HCAPLUS



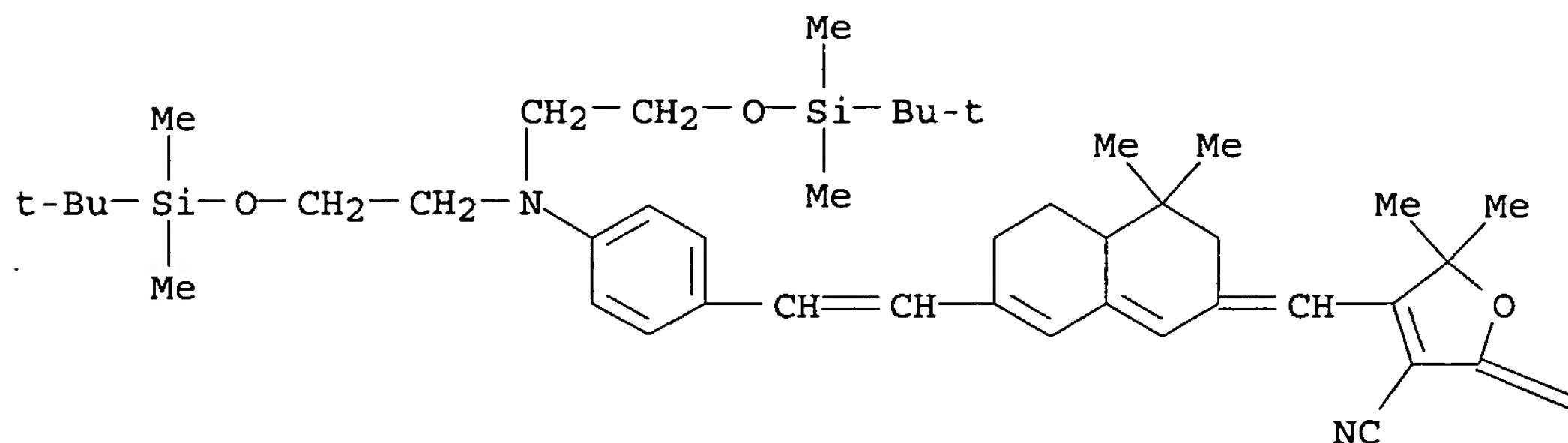
CN Propanedinitrile, [3-cyano-4-[3-[7-[4-(diethylamino)phenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanlylidene] - (9CI) (CA INDEX NAME)



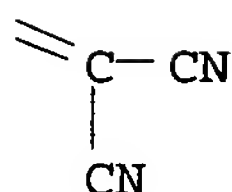
RN 595567-24-1 HCAPLUS

CN Propanedinitrile, [4-[[7-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-4,4a,5,6-tetrahydro-4,4-dimethyl-2(3H)-naphthalenylidene]methyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene] - (9CI) (CA INDEX NAME)

PAGE 1-A



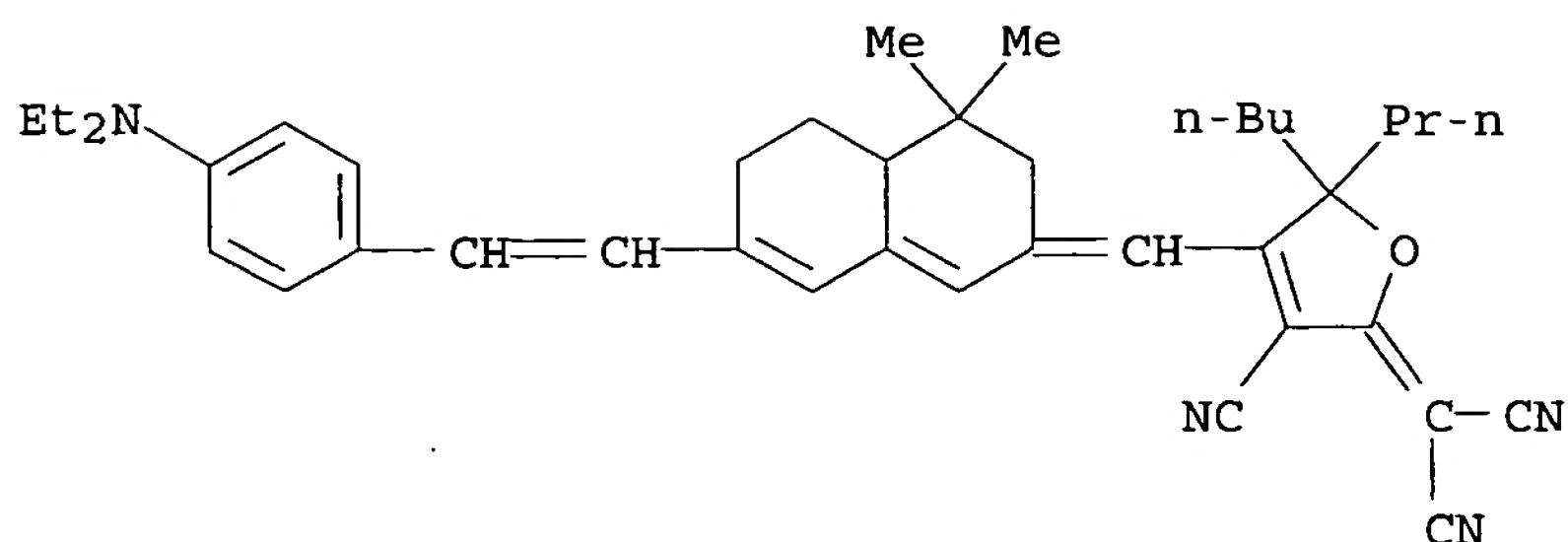
PAGE 1-B



RN 595567-25-2 HCAPLUS

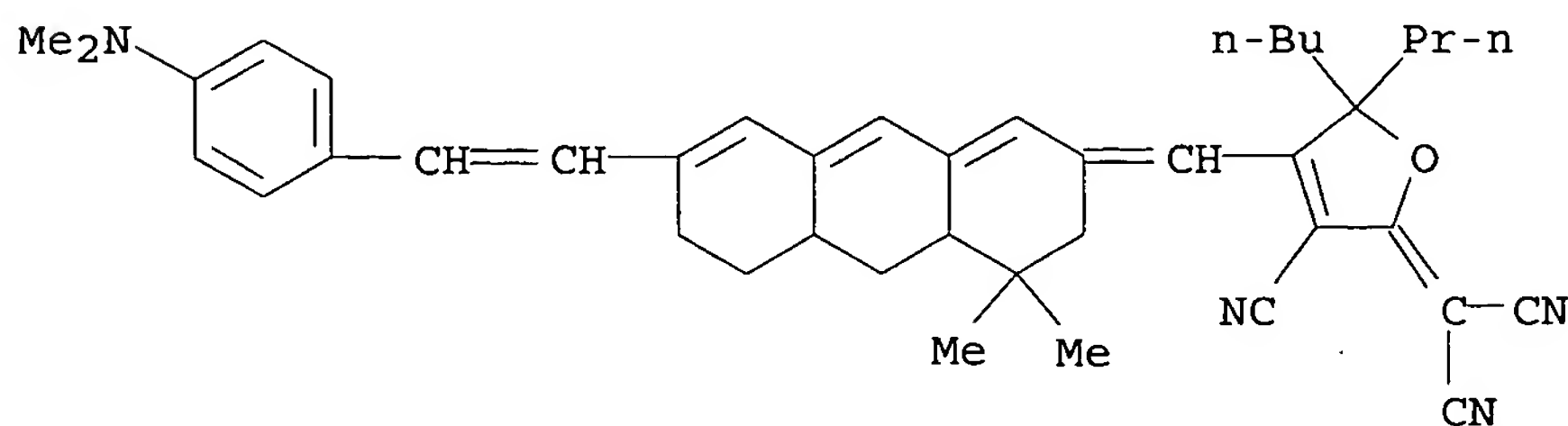
CN Propanedinitrile, [5-butyl-3-cyano-4-[[7-[2-[4-(diethylamino)phenyl]ethenyl]-4,4a,5,6-tetrahydro-4,4-dimethyl-2(3H)-naphthalenylidene]methyl]-5-propyl-2(5H)-furanlylidene] - (9CI) (CA INDEX NAME)

NAME)



RN 595567-26-3 HCAPLUS

CN Propanedinitrile, [5-butyl-3-cyano-4-[[7-[2-[4-(dimethylamino)phenyl]ethenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]methyl]-5-propyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



IT 367272-38-6P 367272-41-1P 595567-93-4P

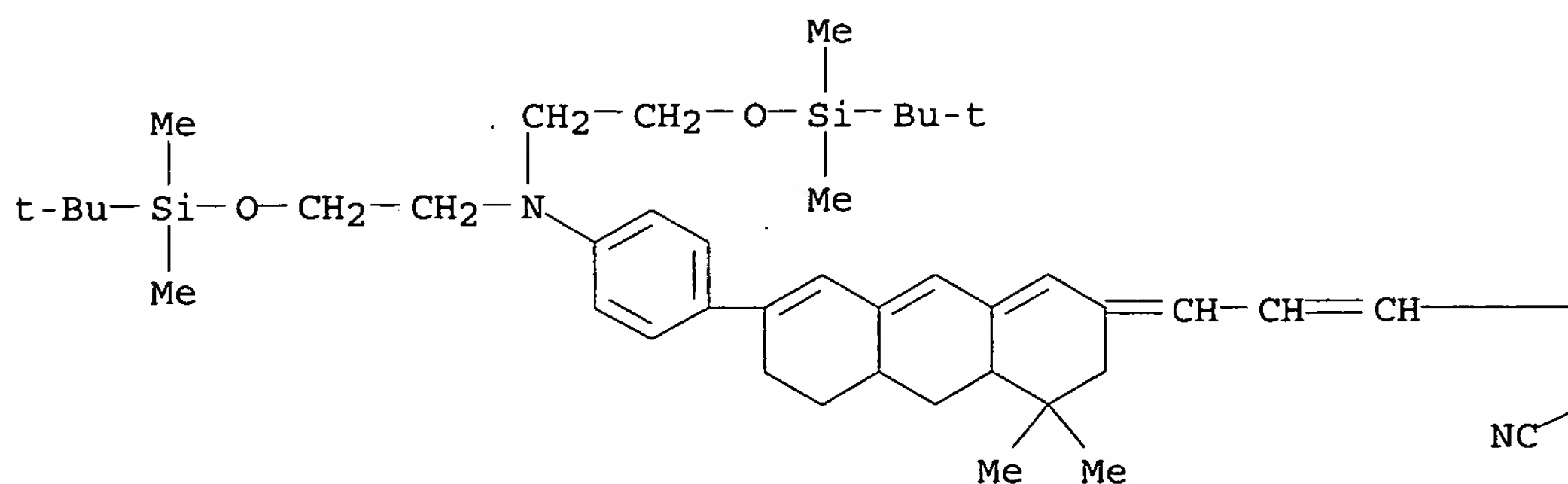
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)

(chromophore; sterically stabilized second-order nonlinear optical chromophores with improved stability and devices incorporating them)

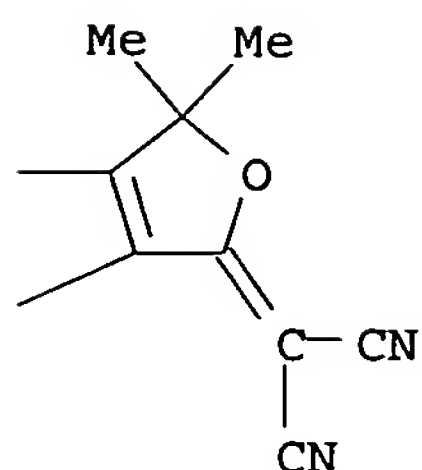
RN 367272-38-6 HCAPLUS

CN Propanedinitrile, [4-[3-[7-[4-[bis[2-[[[1,1-dimethylethyl]dimethylsilyl]oxy]ethyl]amino]phenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

PAGE 1-A

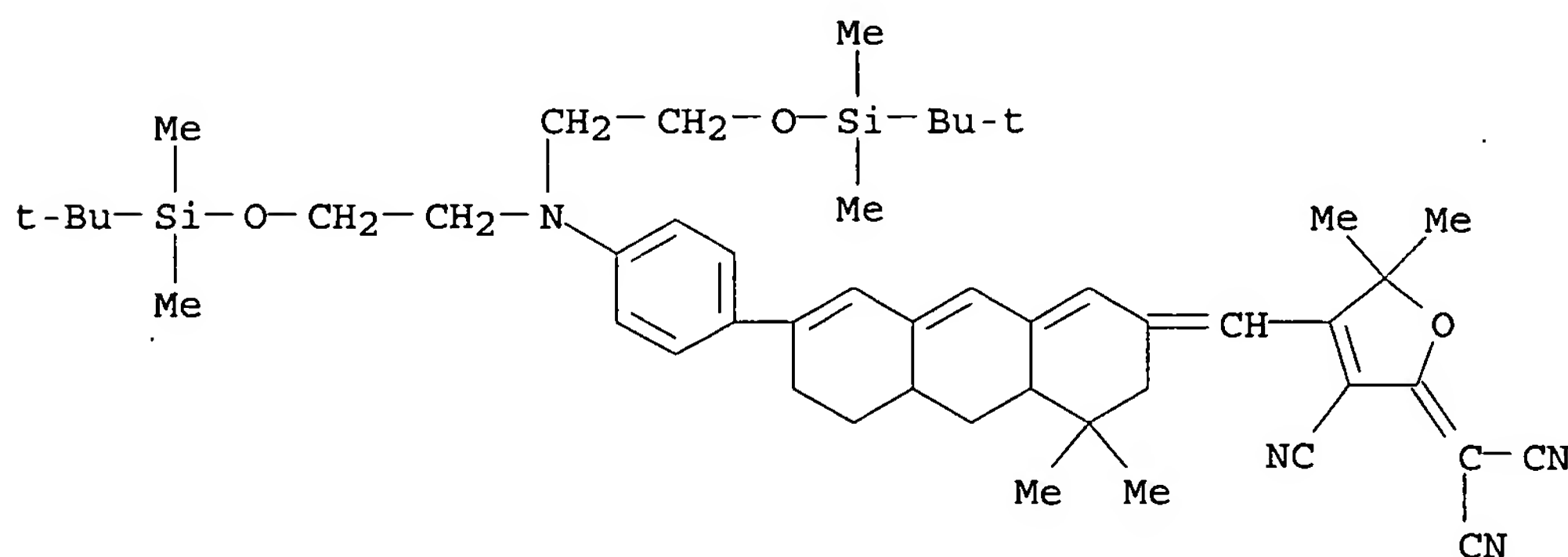


PAGE 1-B



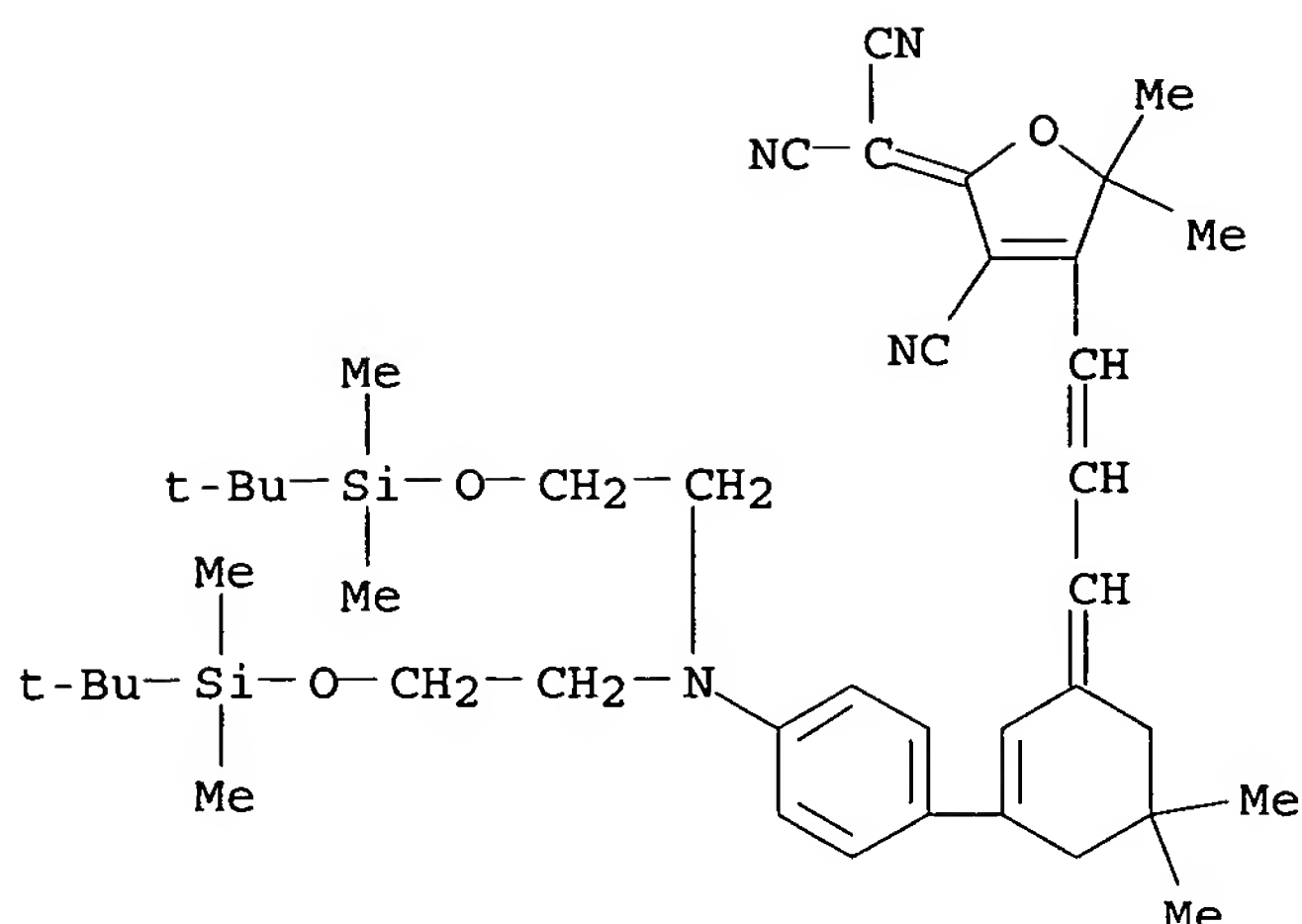
RN 367272-41-1 HCAPLUS

CN Propanedinitrile, [4-[[7-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]methyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 595567-93-4 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



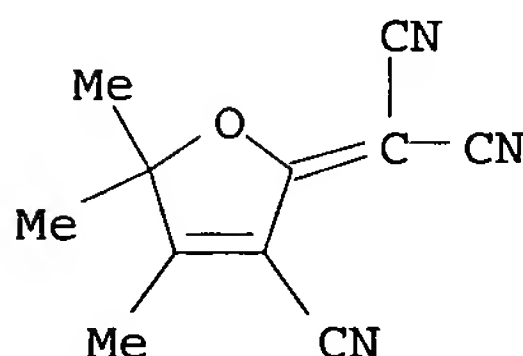
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(sterically stabilized second-order nonlinear optical chromophores with improved stability and devices incorporating them)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furan-3-ylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 81 THERE ARE 81 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 36 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:682934 HCAPLUS

DOCUMENT NUMBER: 140:119503

TITLE: Optically induced focusing-to-defocusing switching and self-trapping of light in a photorefractive organic glass

AUTHOR(S): Chen, Zhigang; Asaro, Marcus; Ostroverkhova, Oksana; Moerner, W. E.; He, Meng; Twieg, R. J.

CORPORATE SOURCE: Center for Photonics Research, TEDA College, Nankai University, Peop. Rep. China

SOURCE: Trends in Optics and Photonics (2003), 87(Photorefractive Effects, Materials, and Devices), 425-429

CODEN: TOPRBS

PUBLISHER: Optical Society of America

DOCUMENT TYPE: Journal

LANGUAGE: English

AB We report the first observation of self-trapping of an optical beam in an organic photorefractive monolithic glass. The orientationally enhanced

photorefractive nonlinearity that gives rise to spatial solitons can be switched from self-focusing to self-defocusing simply by changing the polarization of the optical beam. Our experiment brings about the possibility of using organic materials for soliton-based applications.

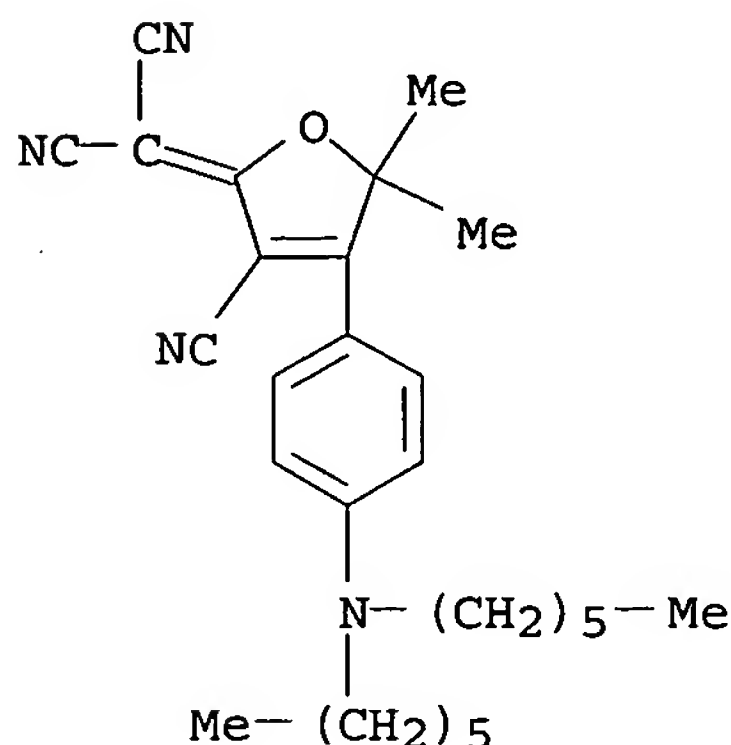
IT 402490-54-4, DCDHF 6

RL: PRP (Properties)

(DCDHF 6; optically induced focusing-to-defocusing switching and self-trapping of light in photorefractive organic glass consisting of mixture of dicyanodihydrofuran derivs.)

RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 37 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:674520 HCAPLUS

DOCUMENT NUMBER: 139:338283

TITLE: Fully Functionalized Photorefractive Polymer with Infrared Sensitivity Based on Novel Chromophores

AUTHOR(S): You, Wei; Cao, Shaokui; Hou, Zhanjia; Yu, Luping

CORPORATE SOURCE: Department of Chemistry and The James Franck Institute, University of Chicago, Chicago, IL, 60637, USA

SOURCE: Macromolecules (2003), 36(19), 7014-7019  
CODEN: MAMOBX; ISSN: 0024-9297

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB This paper describes the synthesis and phys. study of several new photorefractive (PR) polymers, which are composed of a new type of nonlinear optical (NLO) chromophore attached onto conjugated poly(p-phenylene-thiophene)s. Since the NLO chromophore is labile in many reaction conditions, the Stille coupling reaction was used to prepare these polymers. The resulting polymers exhibit high PR performances. An optical gain coefficient of 158 cm<sup>-1</sup> at a field of 50 V/μm and a diffraction efficiency of 68% at a field of 46 V/μm for polymer P1 were obtained, which are among the best values for fully functionalized PR polymers to date.

IT 613667-67-7P 613667-69-9P

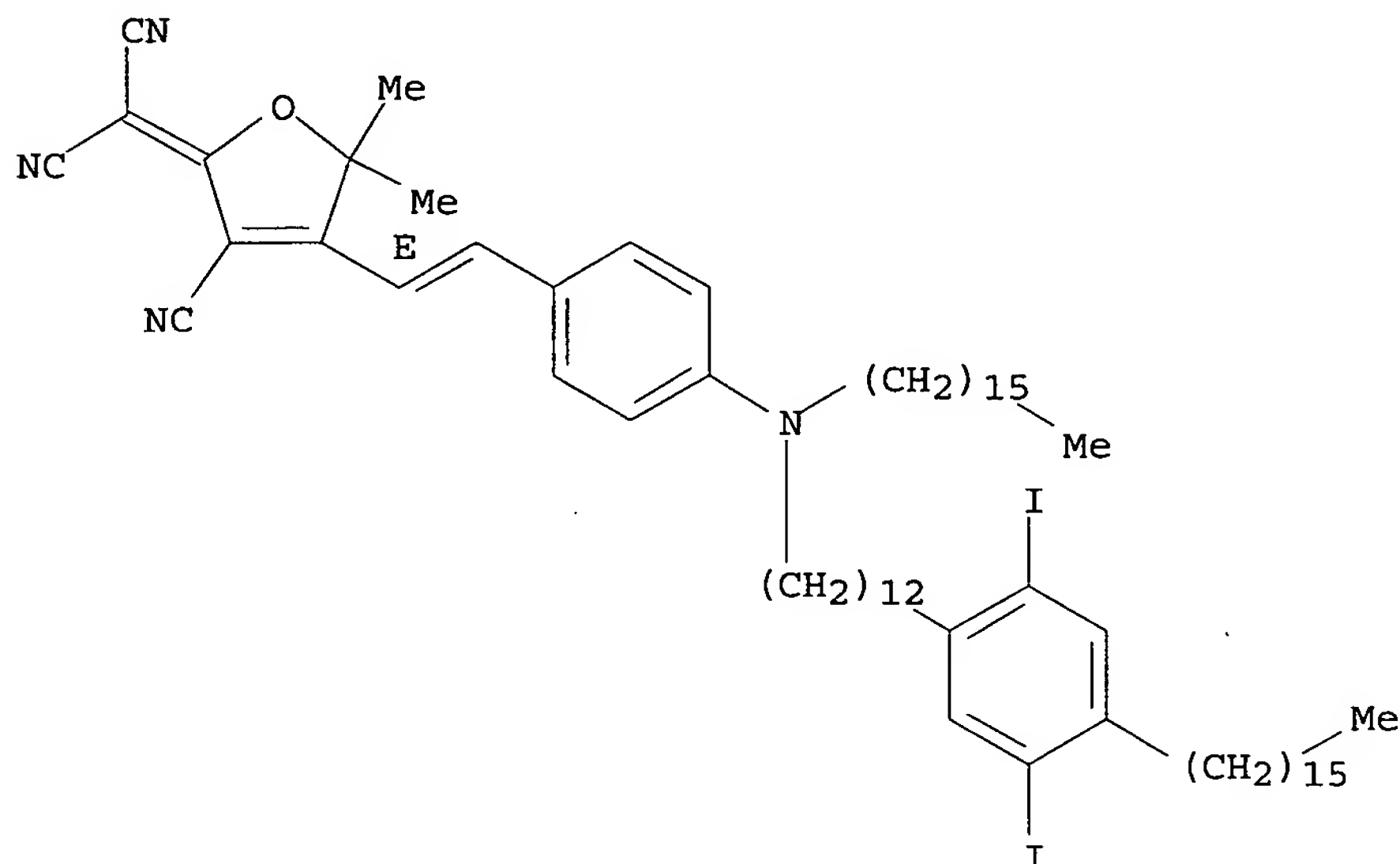
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(monomer; preparation of, and in synthesis of fully functionalized photorefractive polymer)

RN 613667-67-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-[hexadecyl[12-(4-hexadecyl-2,5-diiodophenyl)dodecyl]amino]phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

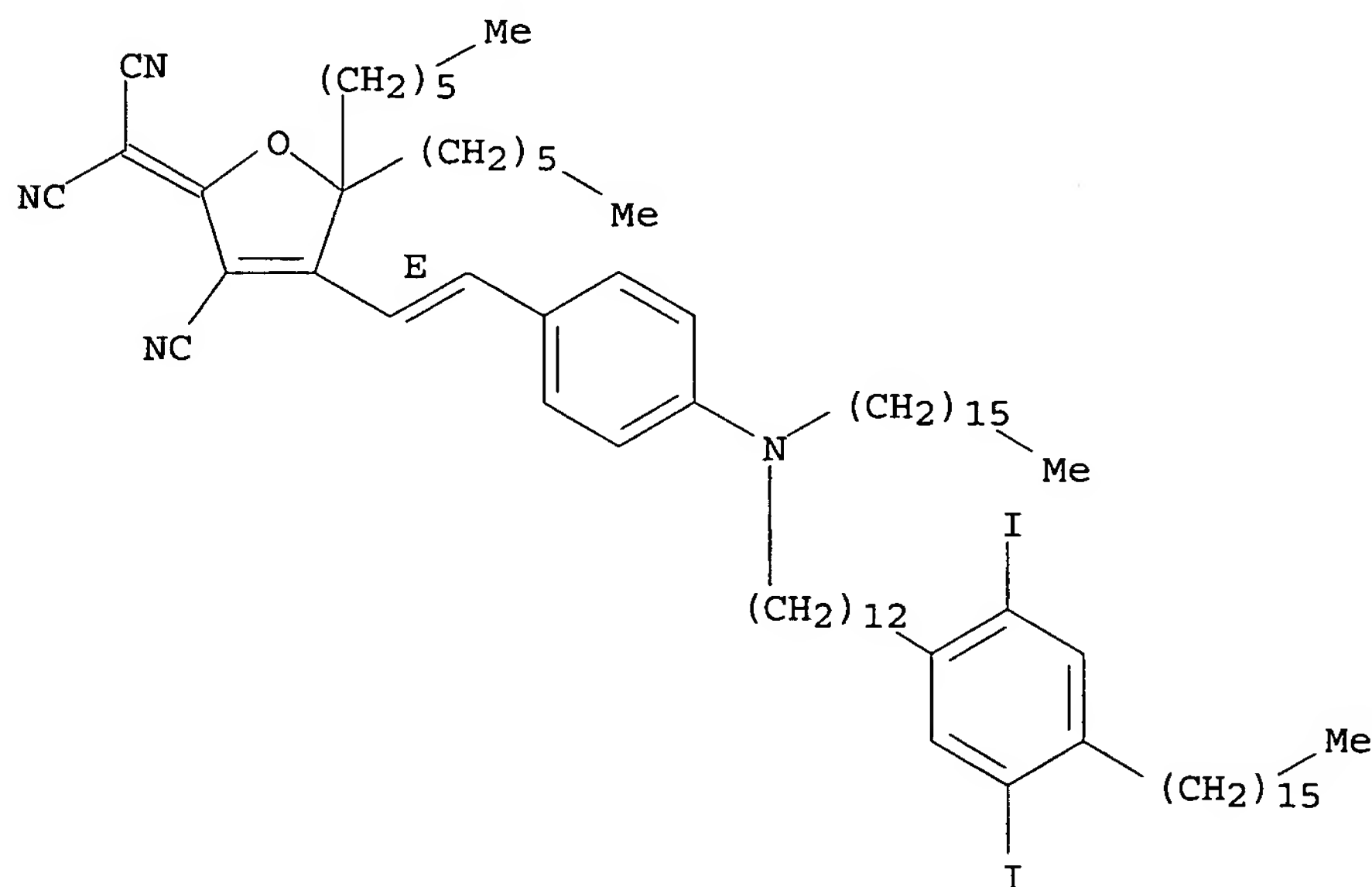
Double bond geometry as shown.



RN 613667-69-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-[hexadecyl[12-(4-hexadecyl-2,5-diiodophenyl)dodecyl]amino]phenyl]ethenyl]-5,5-dihexyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.



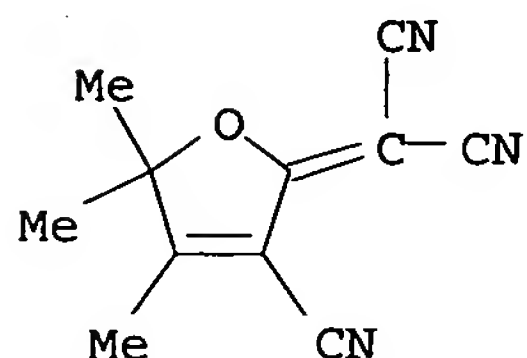
IT 171082-32-9 613667-68-8

RL: RCT (Reactant); RACT (Reactant or reagent)

(reaction with diiodobenzene derivative in preparation of monomers)

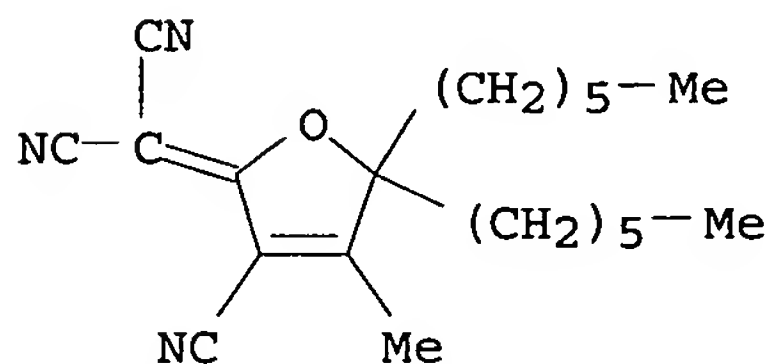
RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



RN 613667-68-8 HCAPLUS

CN Propanedinitrile, (3-cyano-5,5-dihexyl-4-methyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



IT 613667-70-2P 613667-71-3P 613667-72-4P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)

(synthesis of fully functionalized photorefractive polymer based on novel chromophores)

RN 613667-70-2 HCAPLUS

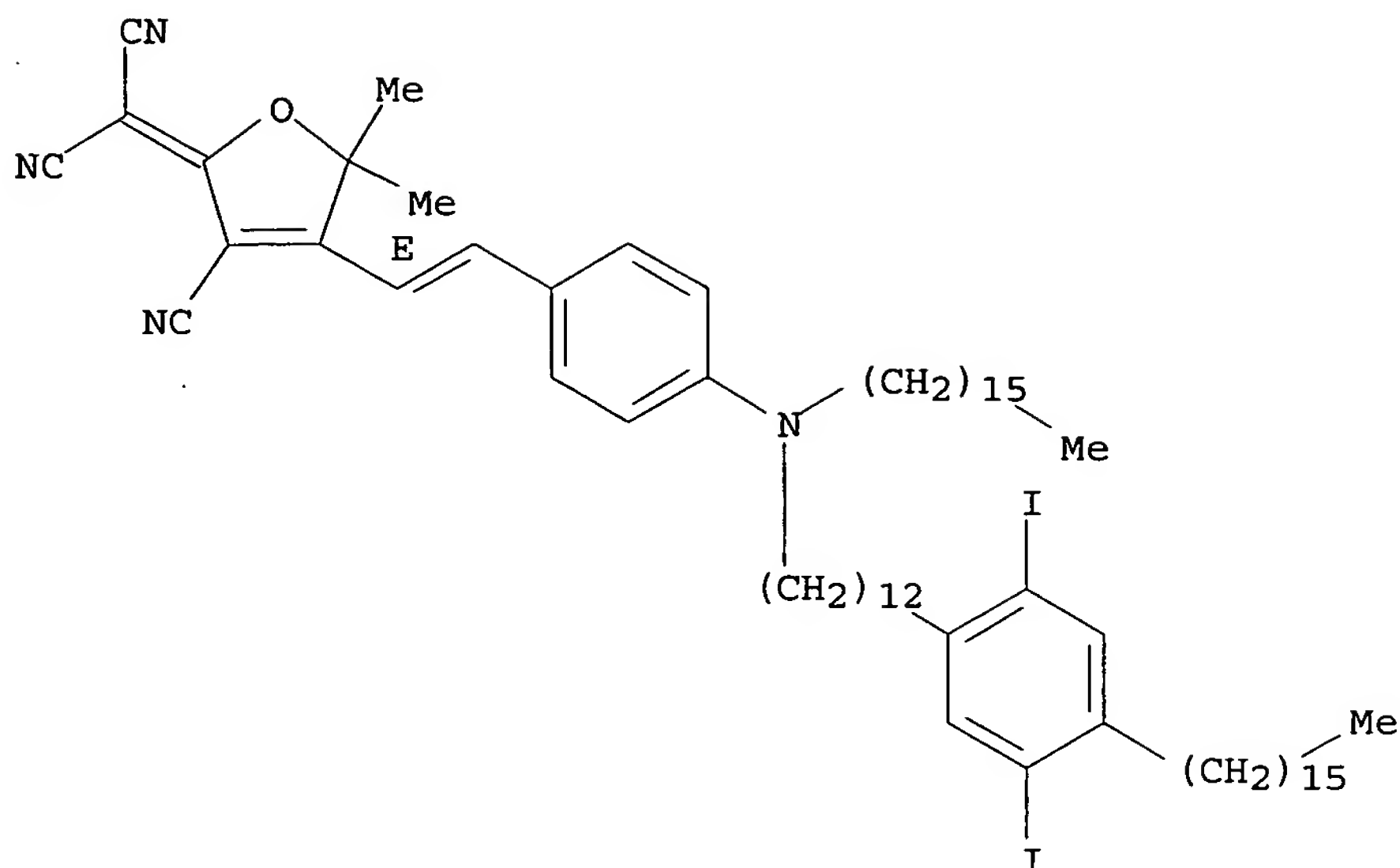
CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-[hexadecyl[12-(4-hexadecyl-2,5-diiodophenyl)dodecyl]amino]phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-, polymer with 2,5-thiophenediylbis[tributylstannane] (9CI) (CA INDEX NAME)

CM 1

CRN 613667-67-7

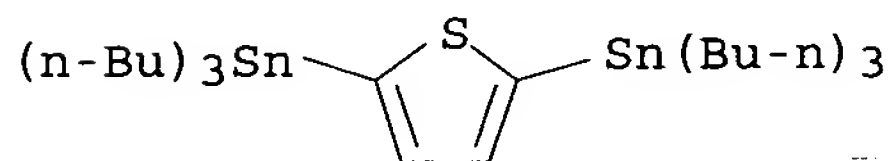
CMF C68 H104 I2 N4 O

Double bond geometry as shown.



CM 2

CRN 145483-63-2  
 CMF C28 H56 S Sn2



RN 613667-71-3 HCAPLUS

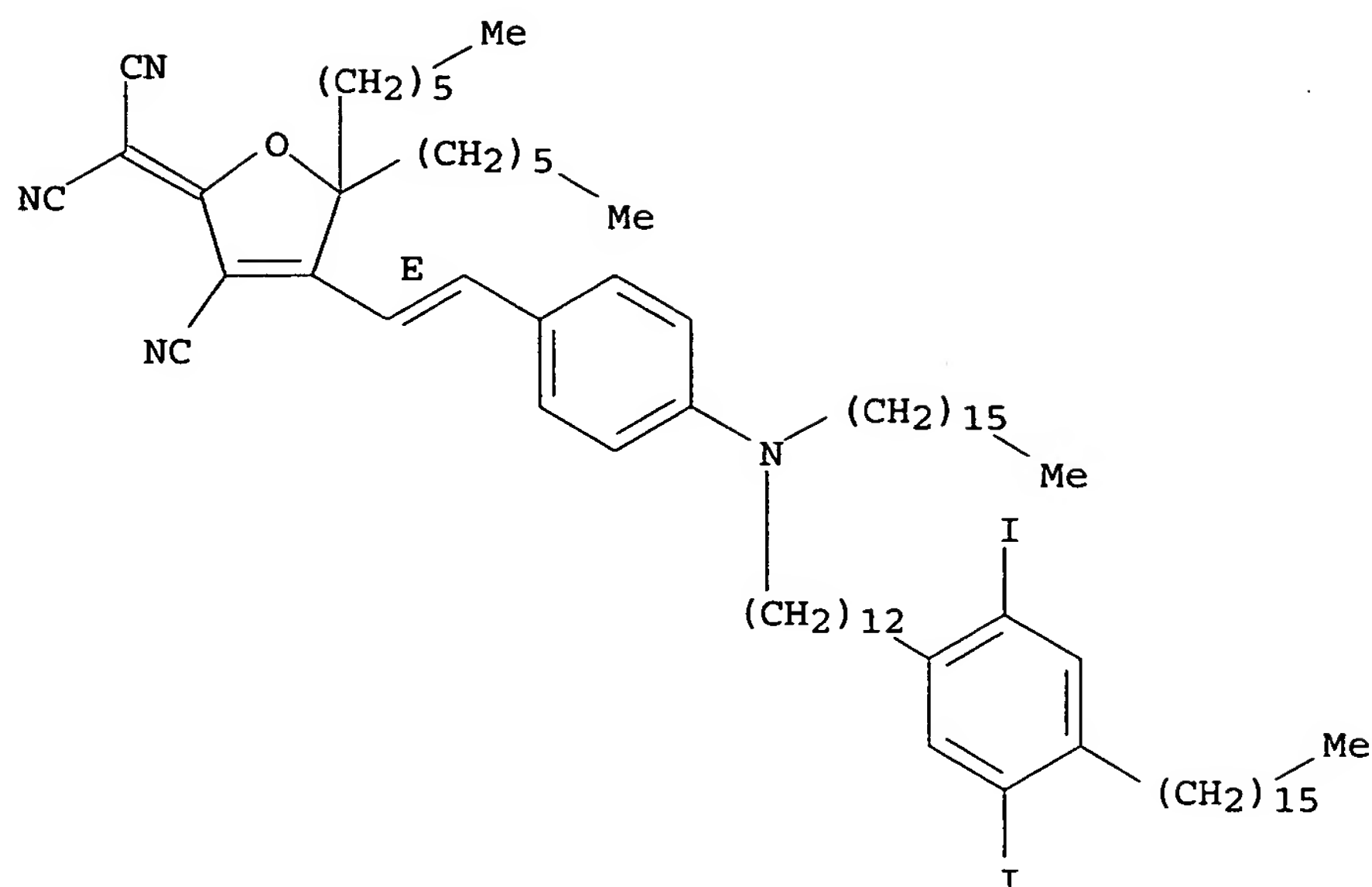
CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-[hexadecyl[12-(4-hexadecyl-2,5-diiodophenyl)dodecyl]amino]phenyl]ethenyl]-5,5-dihexyl-2(5H)-furanylidene]-, polymer with 2,5-thiophenediylbis[tributylstannane] (9CI) (CA INDEX NAME)

CM 1

CRN 613667-69-9  
 CMF C78 H124 I2 N4 O

Double bond geometry as shown.

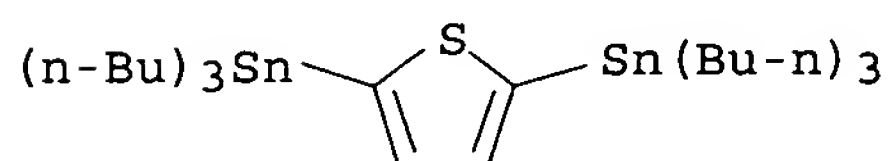




CM 2

CRN 145483-63-2

CMF C28 H56 S Sn2



RN 613667-72-4 HCAPLUS

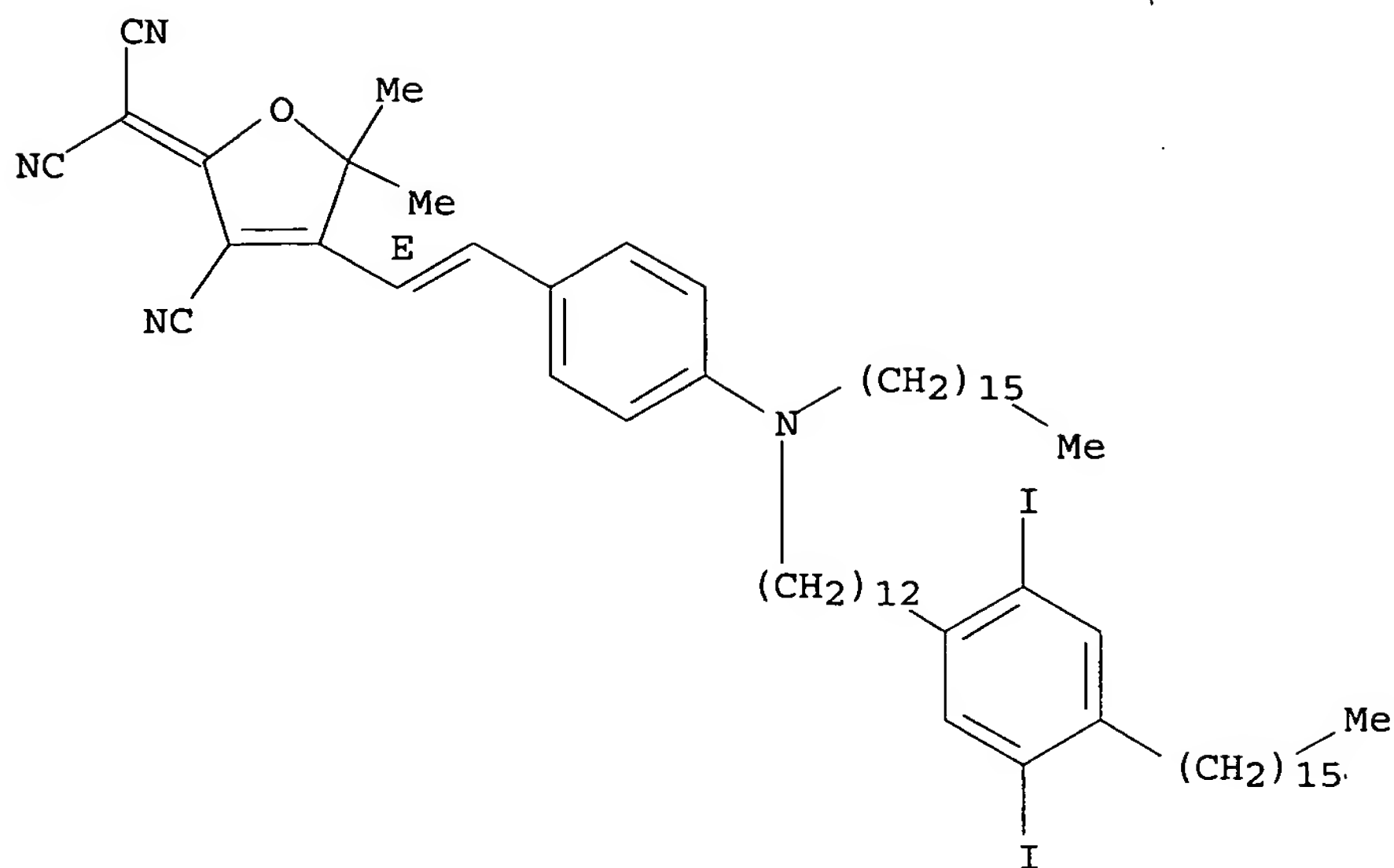
CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-[hexadecyl[12-(4-hexadecyl-2,5-diiodophenyl)dodecyl]amino]phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-, polymer with 1,4-dihexadecyl-2,5-diiodobenzene and 2,5-thiophenediylbis[tributylstannane] (9CI) (CA INDEX NAME)

CM 1

CRN 613667-67-7

CMF C68 H104 I2 N4 O

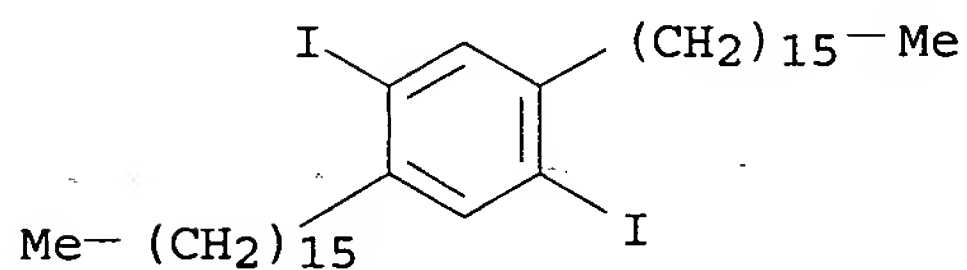
Double bond geometry as shown.



CM 2

CRN 314777-60-1

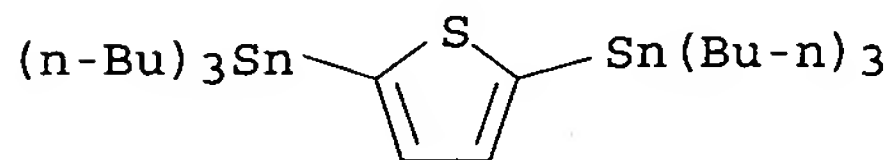
CMF C38 H68 I2



CM 3

CRN 145483-63-2

CMF C28 H56 S Sn2



REFERENCE COUNT: 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 38 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:666658 HCAPLUS

DOCUMENT NUMBER: 140:84155

TITLE: Star-shaped azo based dipolar chromophores: Design, synthesis, matrix compatibility and electro-optic activity

AUTHOR(S): Gopalan, Padma; Katz, Howard E.; McGee, Dave J.; Erben, Chris; Zielinski, Tom; Bousquet, Danielle;

CORPORATE SOURCE: Muller, David; Grazul, John; Olsson, Ylva  
Bell Laboratories, Lucent Technologies, Murray Hill,  
NJ, 07974, USA  
SOURCE: Polymeric Materials Science and Engineering (2003),  
89, 271-272  
CODEN: PMSEDG; ISSN: 0743-0515  
PUBLISHER: American Chemical Society  
DOCUMENT TYPE: Journal; (computer optical disk)  
LANGUAGE: English

AB The authors demonstrated a simple high yielding synthetic procedure involving 3 to 6 steps towards the 1st dendritic azo-based NLO chromophores. These chromophores could be poled in a polycarbonate host to achieve a EO coefficient of  $\leq 25$  pmN at 1550 nm. STEM studies to correlate blend morphol. with the electrooptic activity, indicates that these high mol. weight chromophores form incompatible blends in methacrylate copolymer where as they disperse predominantly into 2 to 20nm domains in amorphous polycarbonate matrix.

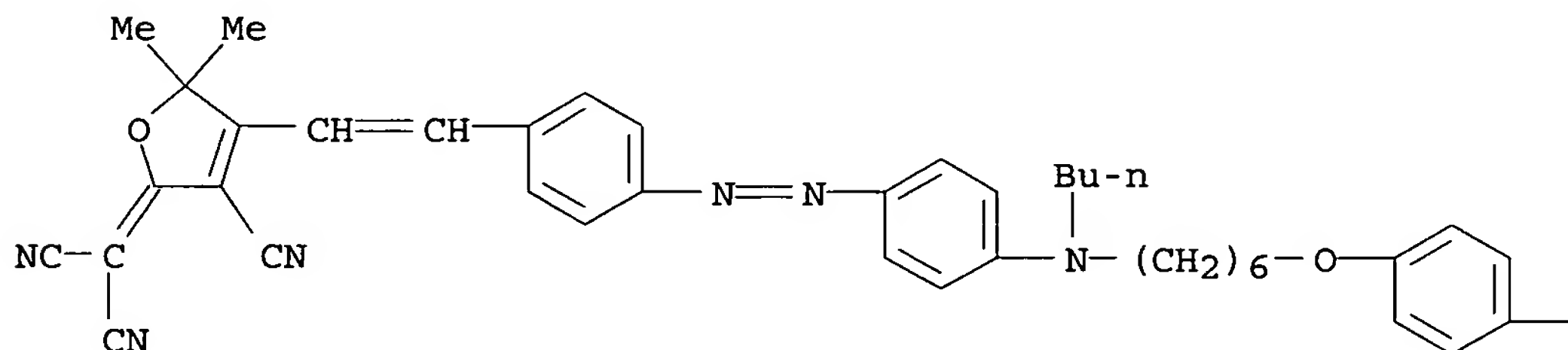
IT 639523-48-1P 639523-50-5P

RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

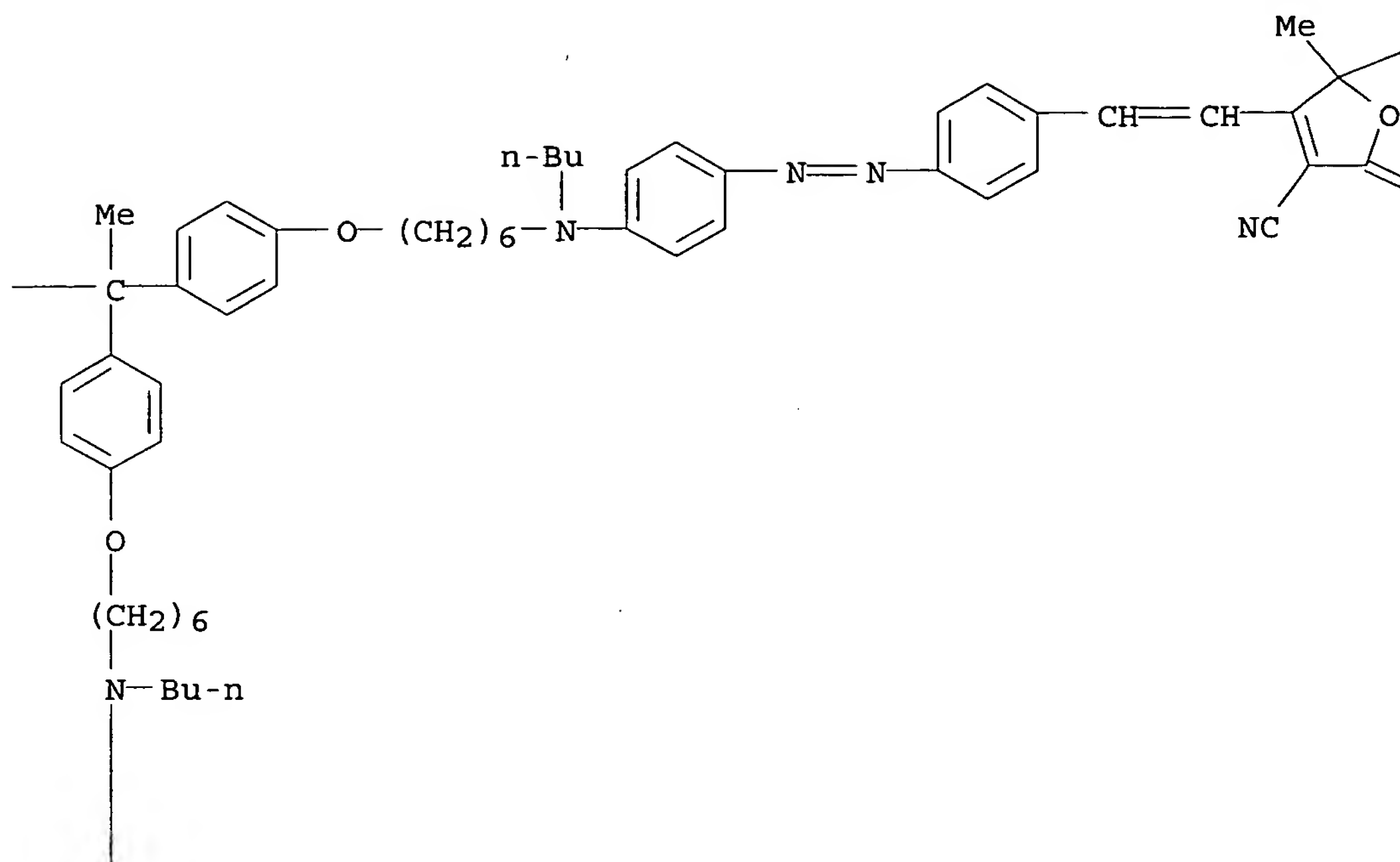
RN 639523-48-1 HCAPLUS

CN Propanedinitrile, 2,2',2''-[ethylidynetris[4,1-phenyleneoxy-6,1-hexanediyl(butylimino)-4,1-phenyleneazo-4,1-phenylene-2,1-ethenediyl(3-cyano-5,5-dimethyl-4-furanyl-2(5H)-ylidene)]]bis- (9CI) (CA INDEX NAME)

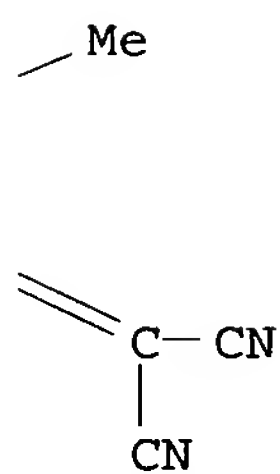
PAGE 1-A



PAGE 1-B



PAGE 1-C

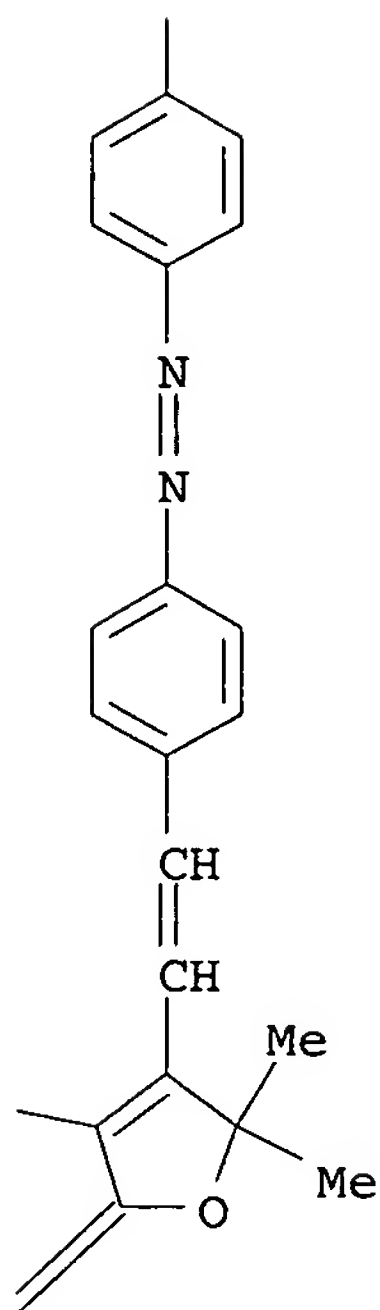


PAGE 2-A

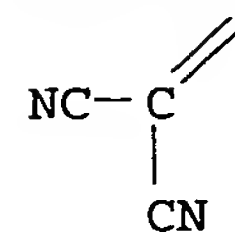
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PAGE 2-B



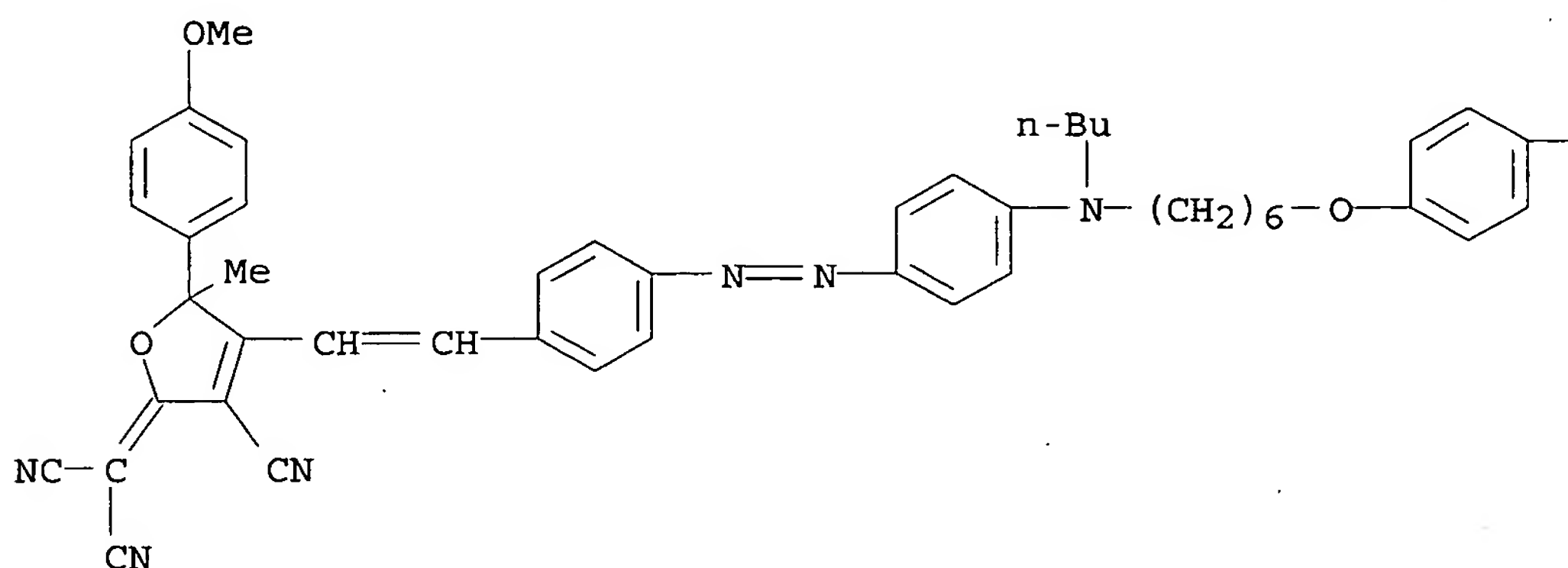
PAGE 3-A



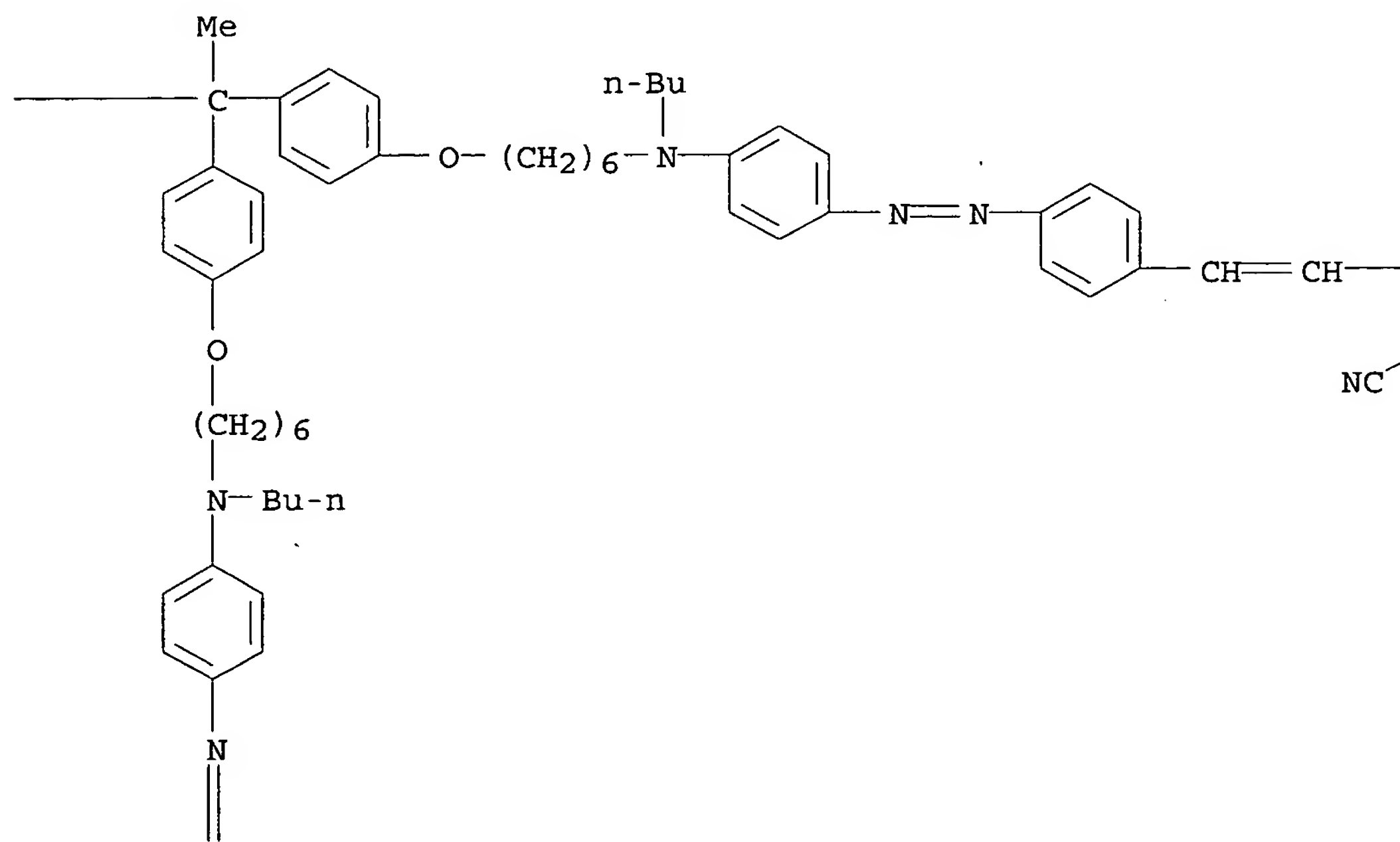
RN 639523-50-5 HCAPLUS

CN Propanedinitrile, 2,2',2''-[ethylidynetris[4,1-phenyleneoxy-6,1-hexanediyl(butylimino)-4,1-phenyleneazo-4,1-phenylene-2,1-ethenediyl(3-cyano-5-(4-methoxyphenyl)-5-methyl-4-furanyl-2(5H)-ylidene)]]bis- (9CI)  
(CA INDEX NAME)

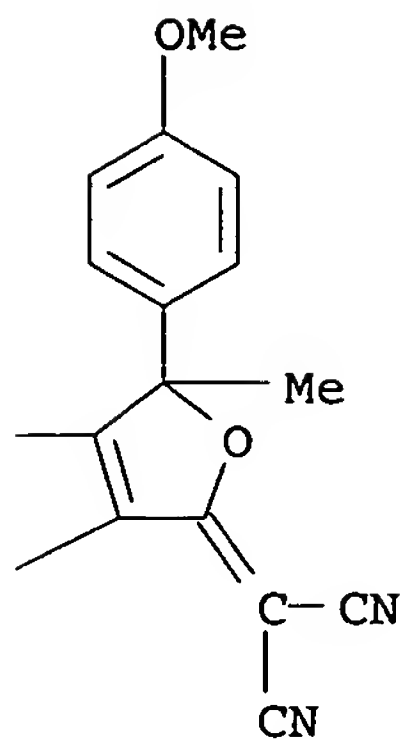
PAGE 1-A



PAGE 1-B



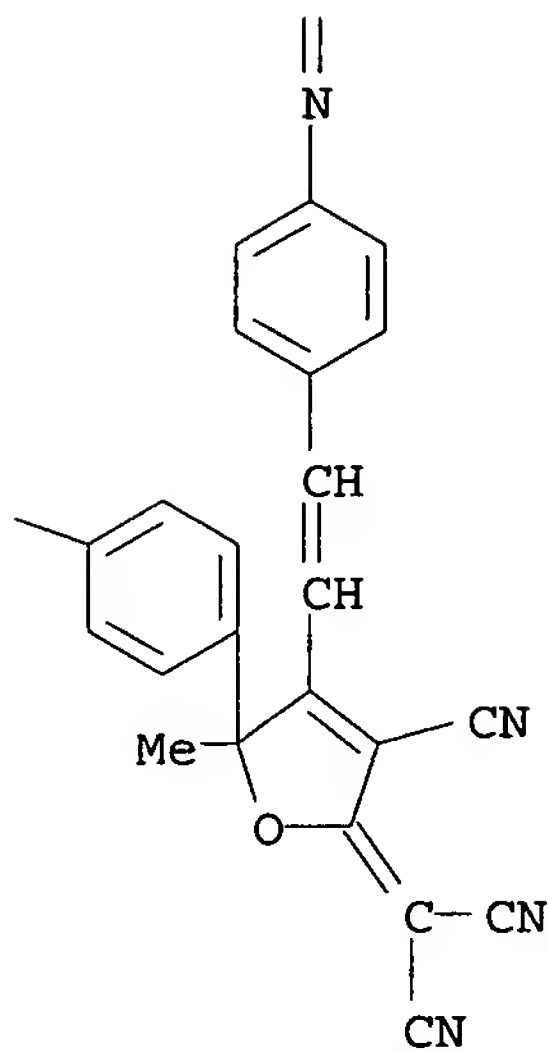
PAGE 1-C



PAGE 2-A

MeO—

PAGE 2-B



IT 639523-41-4 639523-44-7  
 RL: RCT (Reactant); RACT (Reactant or reagent)

(star-shaped azo based dipolar chromophores: design, synthesis, matrix compatibility and electro-optic activity)

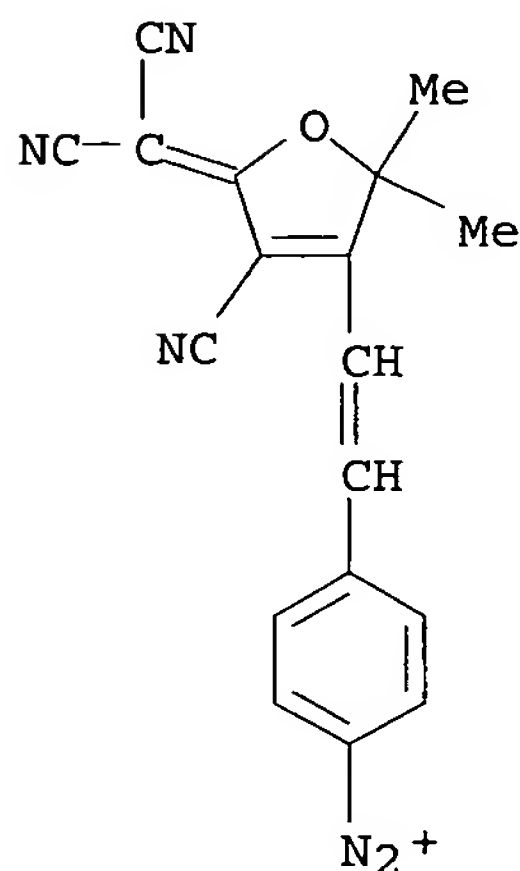
RN 639523-41-4 HCAPLUS

CN Benzenediazonium, 4-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-, hexafluorophosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 639523-40-3

CMF C18 H12 N5 O

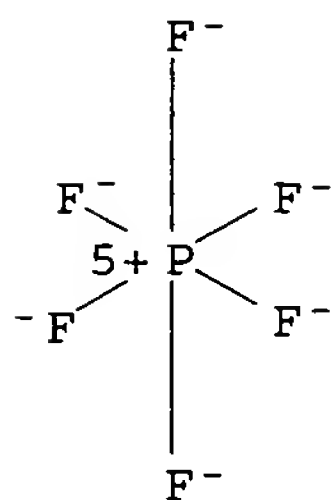


CM 2

CRN 16919-18-9

CMF F6 P

CCI CCS



RN 639523-44-7 HCAPLUS

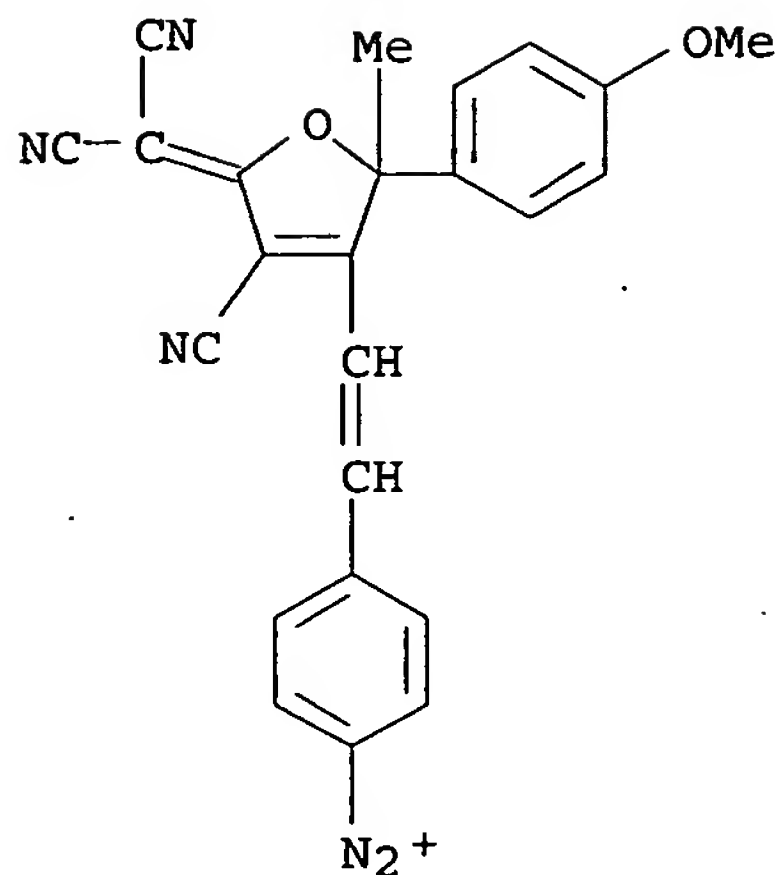
CN Benzenediazonium, 4-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2-(4-methoxyphenyl)-2-methyl-3-furanyl]ethenyl]-, hexafluorophosphate(1-) (9CI) (CA INDEX NAME)

CM 1

CRN 639523-43-6

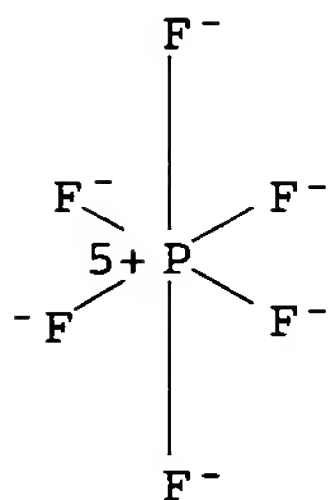
CMF C24 H16 N5 O2





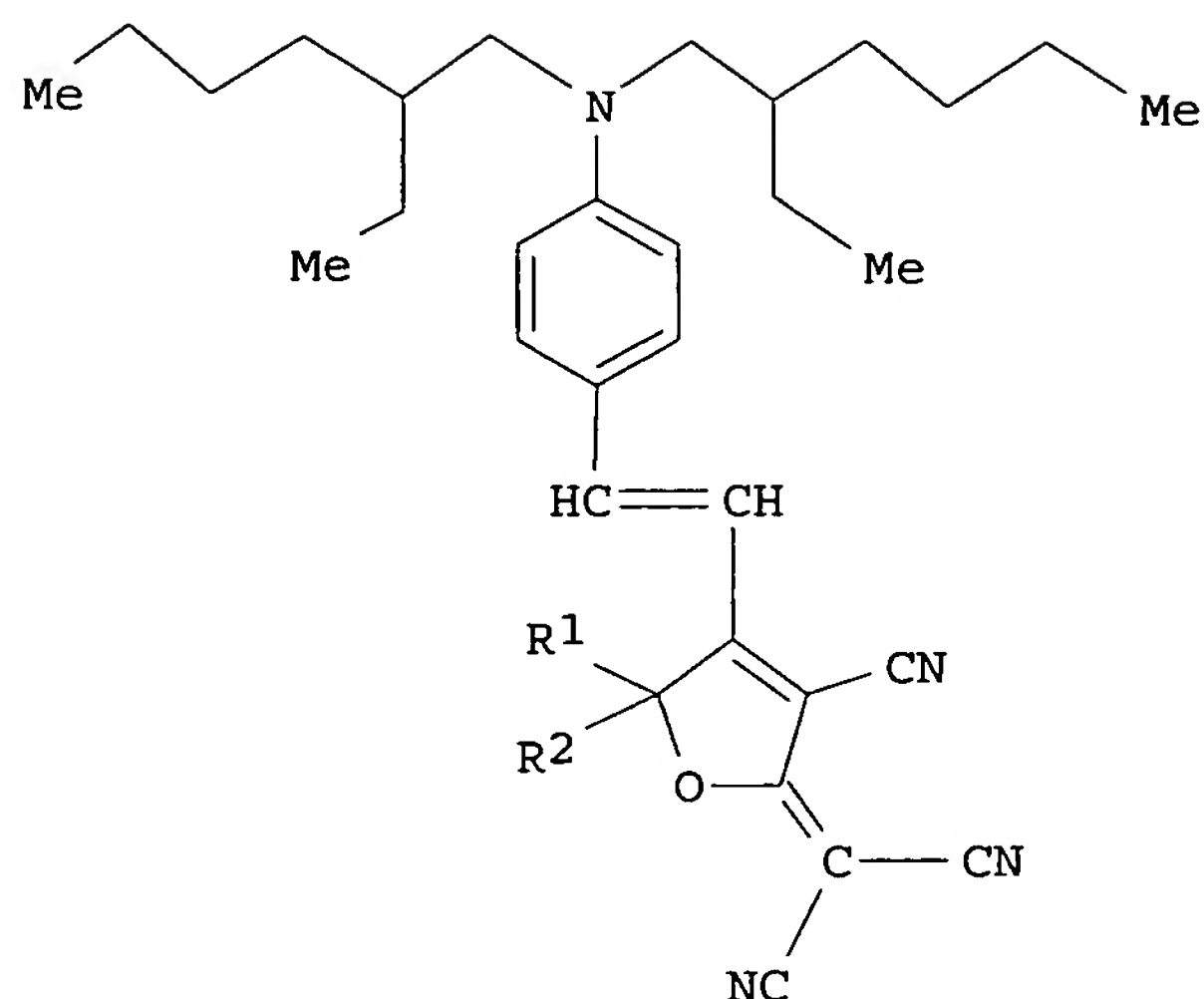
CM 2

CRN 16919-18-9  
CMF F6 P  
CCI CCS



REFERENCE COUNT: 9 THERE ARE 9 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 39 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
ACCESSION NUMBER: 2003:658198 HCAPLUS  
DOCUMENT NUMBER: 140:84153  
TITLE: Fine tuning photorefractive properties of molecular photorefractive materials  
AUTHOR(S): You, Wei; Hou, Zhanjia; Yu, Luping  
CORPORATE SOURCE: Department of Chemistry and The James Franck Institute, The University of Chicago, Chicago, IL, 60637, USA  
SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (2003), 44(2), 697-698  
CODEN: ACPPAY; ISSN: 0032-3934  
PUBLISHER: American Chemical Society, Division of Polymer Chemistry  
DOCUMENT TYPE: Journal; (computer optical disk)  
LANGUAGE: English  
GI



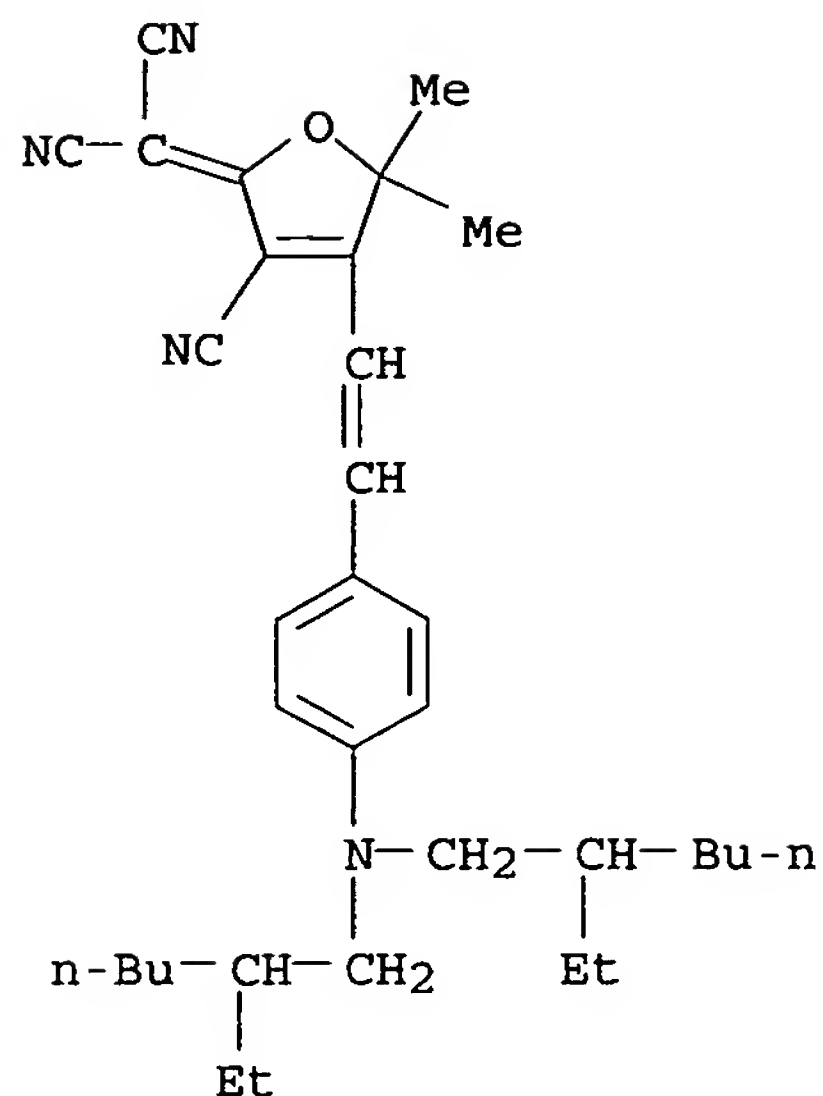
AB A monolithic, mol., photorefractive material system is presented (I; R = R1 = Me, Et, Bu, n-hexyl). The 4 compds. differ only in the alkyl substituents of the tricyano-substituted furan unit. The glass transition temperature, the absorption coeffs., the refractive index, the dark current, and the photocurrent of the 4 compds. are listed. The glass transitions were around room temperature, and the compds. exhibited excellent transparency in the near-IR and IR region. Large-net optical gains and high diffraction efficiencies were obtained at relatively low external fields. Amorphous films of the materials were fabricated by heating them near the m.p. and sandwiching them between 2 ITO-coated glass substrates. Their photorefractive properties were determined as a function of the alkyl groups R and R1. The best photorefractive performance was achieved for the compound with R = R1 = Et.

IT 481642-79-9 560107-74-6 560107-75-7  
639519-72-5

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)  
(fine tuning photorefractive and photoelec. properties of mol. photorefractive materials)

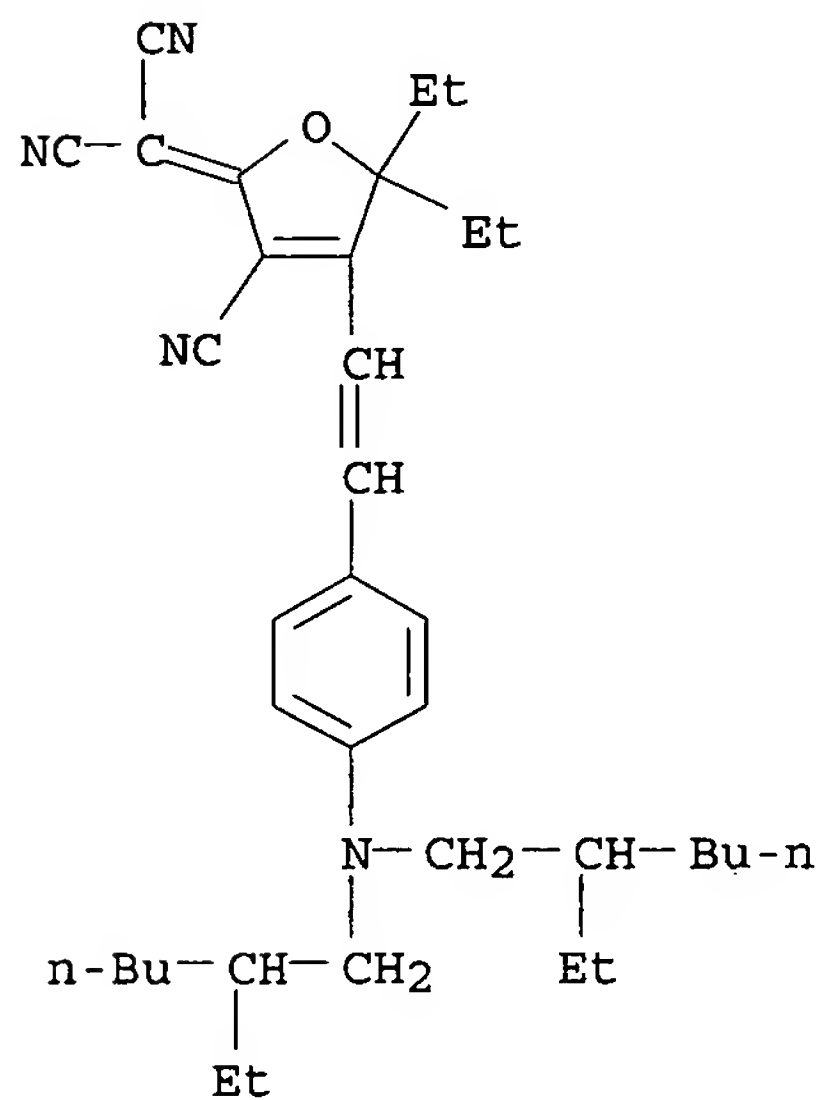
RN 481642-79-9 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



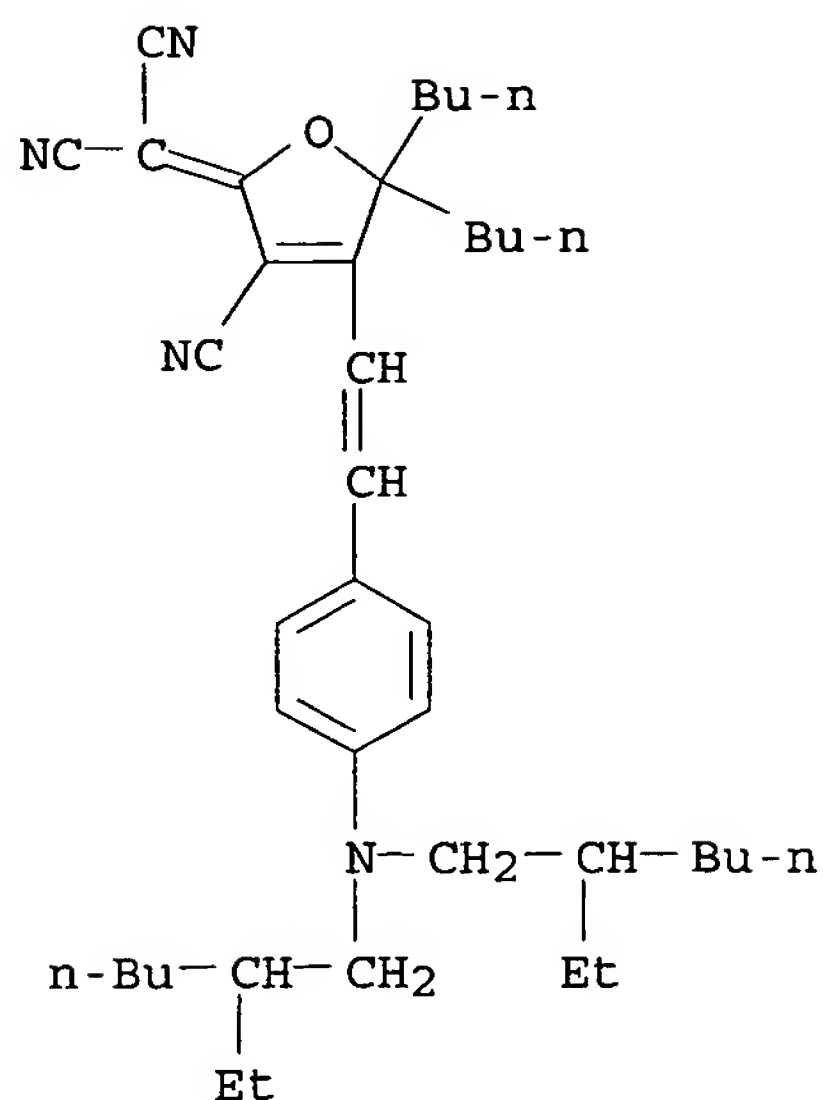
RN 560107-74-6 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-diethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



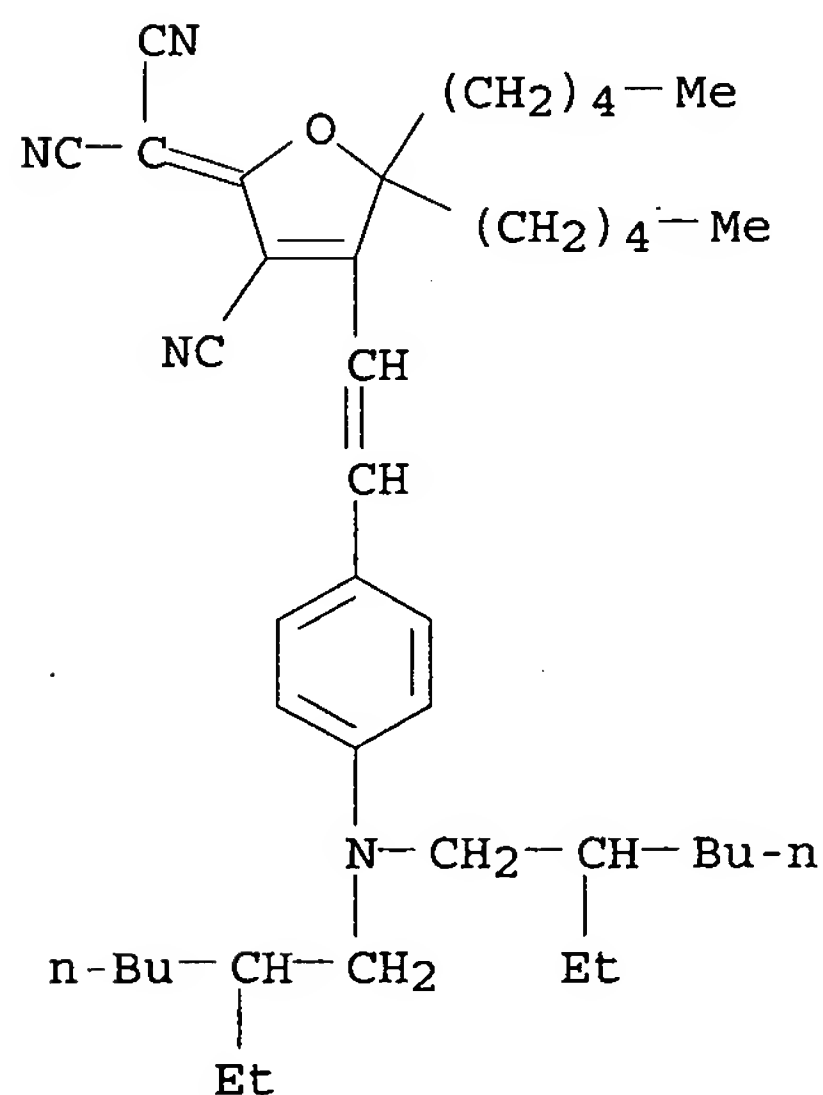
RN 560107-75-7 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 639519-72-5 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-dipentyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 40 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:632276 HCAPLUS

DOCUMENT NUMBER: 140:294194

TITLE: Effects of alkyl spacer group length on Vis-NIR absorption behavior in FTC-like guest-host EO polymers  
 AUTHOR(S): Barto, Richard R., Jr.; Bedworth, Peter V.; Epstein, Joseph A.; Ermer, Susan P.; Taylor, Rebecca E.; Frank,

Curtis W.  
 CORPORATE SOURCE: Lockheed Martin Space Systems Co., USA  
 SOURCE: Proceedings of SPIE-The International Society for  
 Optical Engineering (2003), 4991(Organic Photonic  
 Materials and Devices V), 575-588  
 CODEN: PSISDG; ISSN: 0277-786X  
 PUBLISHER: SPIE-The International Society for Optical Engineering  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB Spectral absorption behavior of FTC-like dyes of varying shape incorporated into amorphous polycarbonate (APC) were characterized by photothermal deflection spectroscopy. Previous Monte Carlo calcns. by Dalton and Robinson predict a strong dependence of the macroscopic nonlinear optical susceptibility on the chromophore waist:length aspect ratio in elec. field-poled films. This dependence arises from London interactions between chromophores, which are expected to influence the absorption characteristics of the composite both by changing the local polarity of the medium and through dipole interactions. It is expected that these interactions will play a role in the absorption characteristics of unpoled films as well. Of particular interest are the spectral characteristics of the red edge of the main dye electronic absorption peak, and the fine structure in the near-IR, dominated by overtones of fundamental C-H stretching and bending modes. The spectral structure in these key regions can be influenced by inter- and intramol. interactions and conformational changes in the dye. The near-IR structure, in turn, will dictate absorption loss in optical devices prepared from these materials at key transmission wavelengths (1.3 and 1.55  $\mu\text{m}$ ). A homologous series of spacer lengths, ranging from Et to hexyl, attached to an FTC-like NLO chromophore, LMCO-46M, was characterized by a combination of photothermal deflection spectroscopy (PDS) and UV-visible spectroscopy to examine the effects of the mol. environment on near-IR loss at 1090 nm, 1300 nm and 1550 nm.

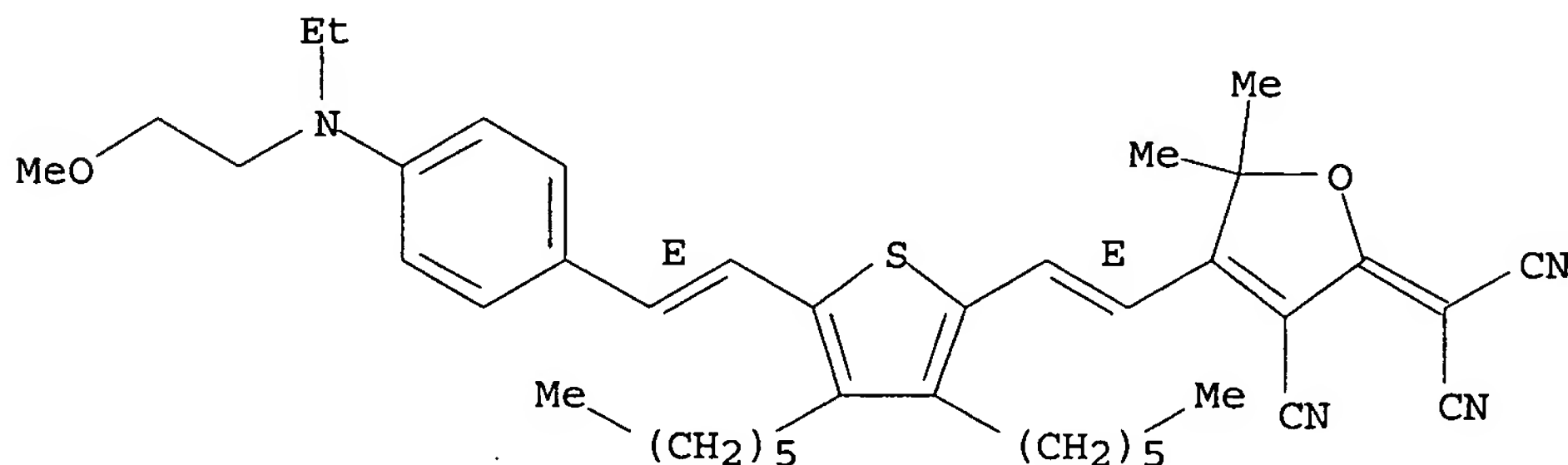
IT 473796-78-0 676256-53-4 676256-54-5  
 676256-55-6

RL: OCU (Occurrence, unclassified); PRP (Properties); OCCU (Occurrence)  
 (effects of alkyl spacer group length on Vis-NIR absorption behavior in  
 FTC-like guest-host EO polymers)

RN 473796-78-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E)-2-[5-[(2E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-3,4-dihexyl-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

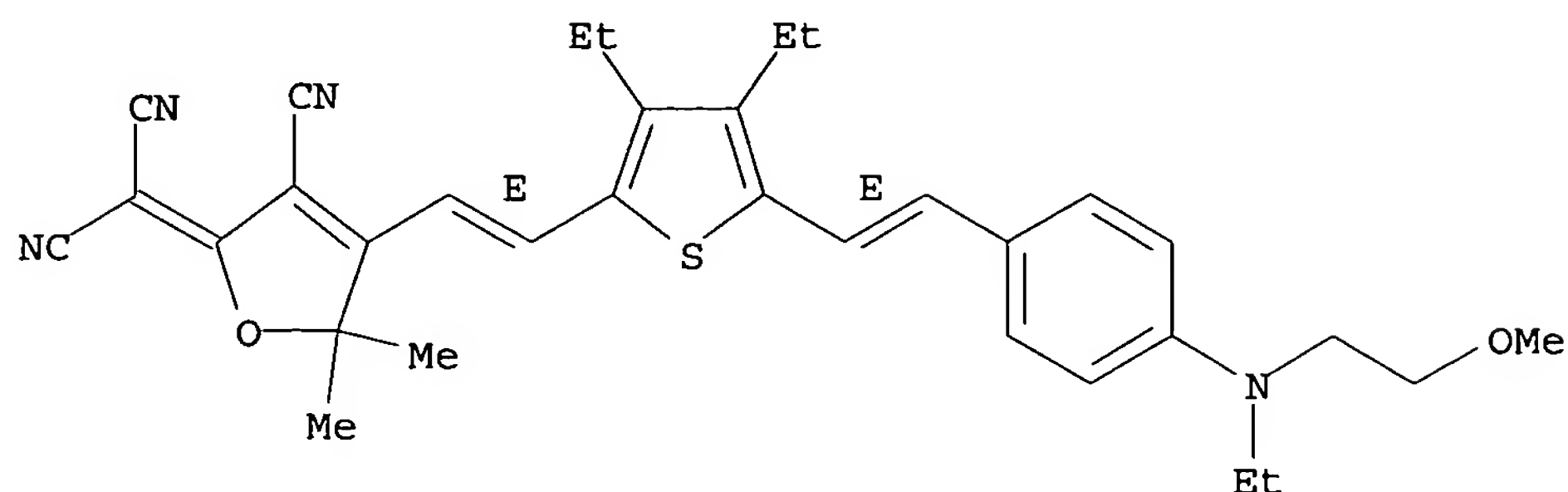


RN 676256-53-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-diethyl-5-[(1E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-

furanylidene]- (9CI) (CA INDEX NAME)

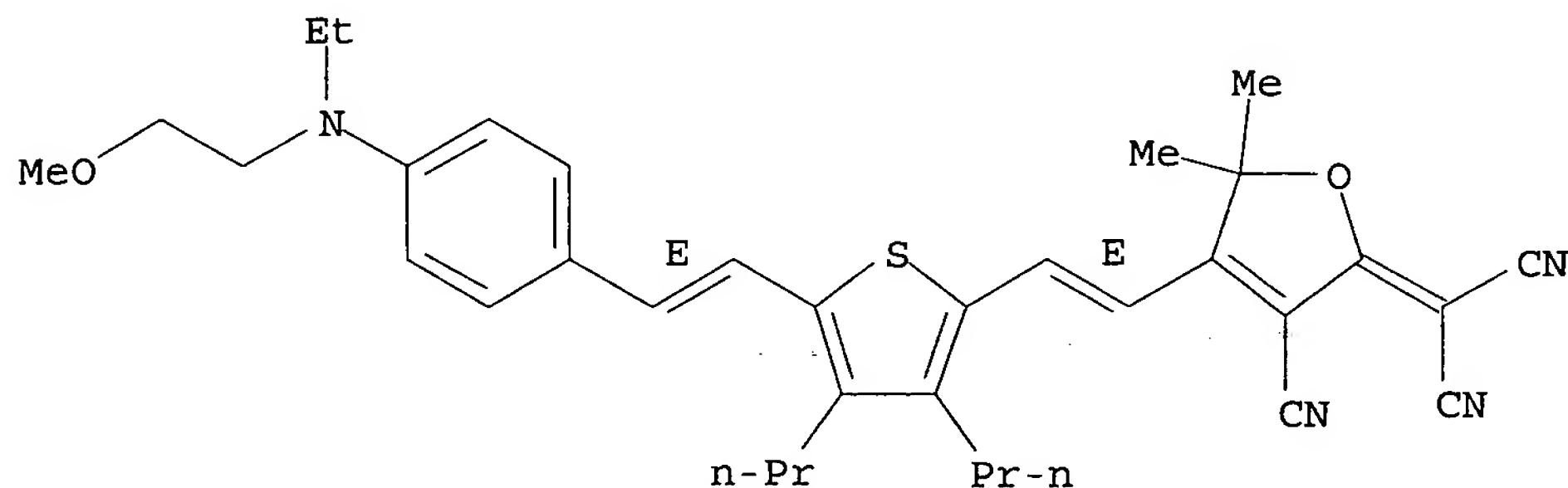
Double bond geometry as shown.



RN 676256-54-5 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-3,4-dipropyl-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

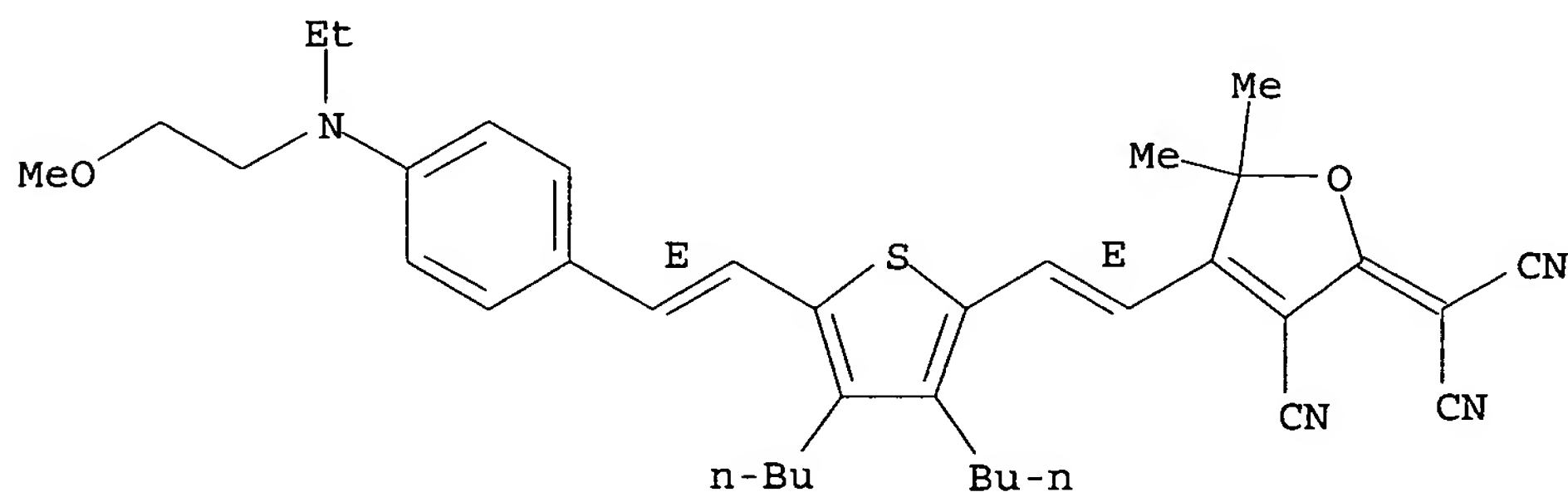
Double bond geometry as shown.



RN 676256-55-6 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dibutyl-5-[(1E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT:

49 THERE ARE 49 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 41 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:632270 HCAPLUS

DOCUMENT NUMBER: 140:294388

TITLE: Novel perfluorocyclobutyl(PFCB) polymers containing isophorone-derived chromophore for electro-optic [EO] applications

AUTHOR(S): Suresh, S.; Chen, Shengrong; Topping, Chris M.; Ballato, John M.; Smith, Dennis W., Jr.

CORPORATE SOURCE: Department of Chemistry, Clemson Univ., Clemson, GA, 29634, USA

SOURCE: Proceedings of SPIE-The International Society for Optical Engineering (2003), 4991(Organic Photonic Materials and Devices V), 530-536

CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Perfluorocyclobutyl (PFCB) polymers and copolymers have a unique combination of properties well suited for optical applications such as high temperature stability, precisely controlled refractive index, low moisture absorption, excellent melt and solution processability, a variable thermo-optic coefficient, and low transmission loss at 1300 and 1550 nm. Electrooptical devices from polymers of ring locked polyene chromophores are attractive due to their thermal, mech., optical and dielec. properties. Polyene chromophores with highest hyperpolarizability are covalently attached to trifluorovinyl aryl ether containing moieties and copolymerized with other monomers. The resulting polymers display improved thermal stability, solubility and good film forming capabilities.

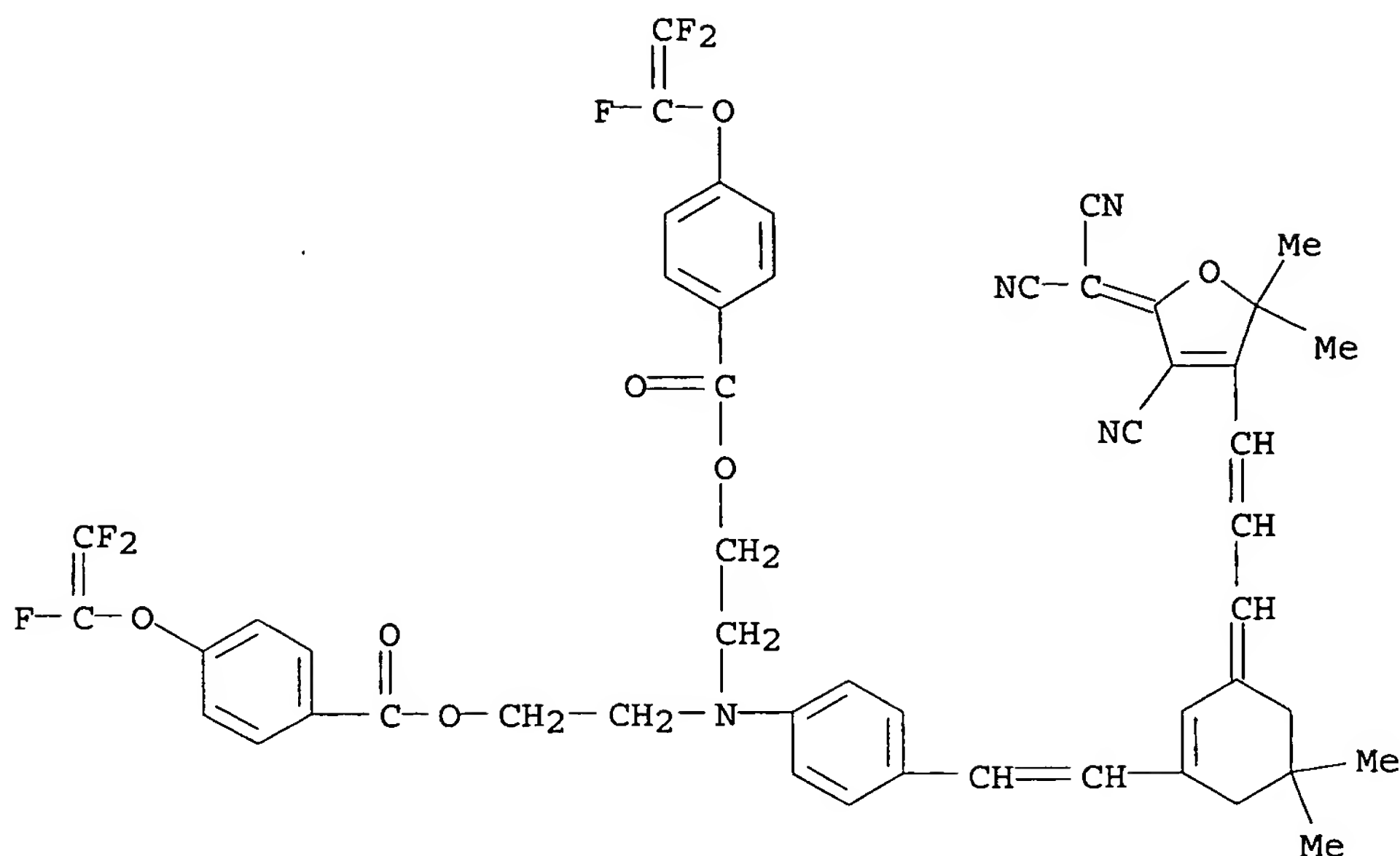
IT 530101-16-7

RL: RCT (Reactant); RACT (Reactant or reagent)

(novel perfluorocyclobutyl(PFCB) polymers containing isophorone-derived chromophore for electro-optic [EO] applications)

RN 530101-16-7 HCAPLUS

CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3-[3-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)



REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 42 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:584115 HCAPLUS

DOCUMENT NUMBER: 139:298386

TITLE: Role of temperature in controlling performance of photorefractive organic glasses

AUTHOR(S): Ostroverkhova, Oksana; He, Meng; Twieg, Robert J.; Moerner, W. E.

CORPORATE SOURCE: Department of Chemistry, Stanford University, Stanford, CA, 94305-5080, USA

SOURCE: ChemPhysChem (2003), 4(7), 732-744

CODEN: CPCHFT; ISSN: 1439-4235

PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A temperature-dependence study is presented of dielec., birefringent, conductive, and photorefractive (PR) properties of high-performance low-mol. weight organic glasses that contain 2-dicyanomethylene-3-cyano-2,5-dihydrofuran (DCDHF) derivs. DCDHF organic glasses sensitized with C60 exhibit high 2-beam coupling gain coeffs. in the red-wavelength region. In the best performing DCDHF glasses at room temperature the PR dynamics are limited by slow mol. reorientation in the elec. field. While orientational and PR speed can be significantly improved by increasing the temperature above the glass-transition temperature of the material, the steady-state

performance may worsen. Comprehensive study of the temperature dependence of various processes, which contribute to the PR effect in DCDHF glasses, clarifies the limiting factors and allows for optimization of the overall PR performance.

IT 402490-54-4, DCDHF-6 481642-77-7, DCDHF-8

481642-78-8, DCDHF-6-CF3

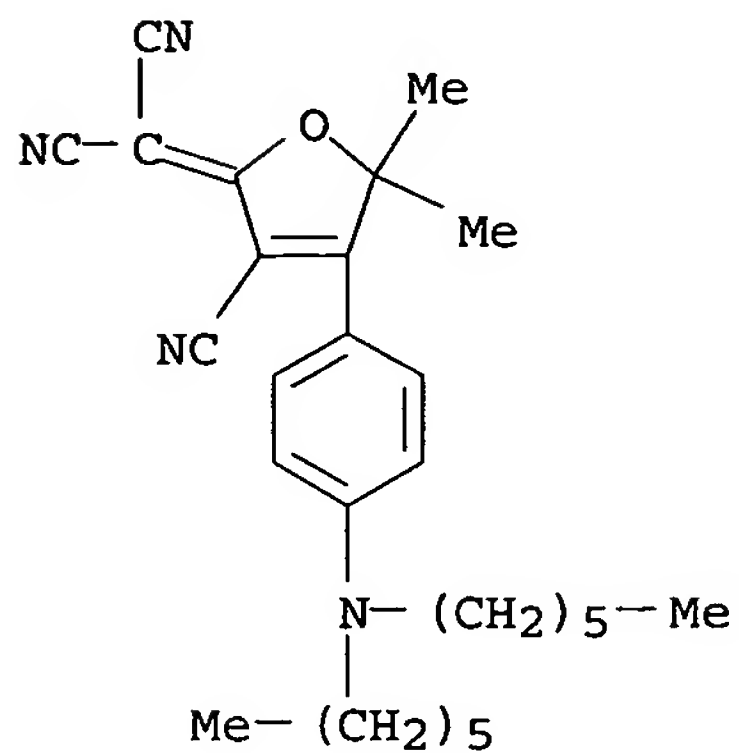
RL: PRP (Properties)

(temperature role in controlling photorefractive organic glasses containing)

RN 402490-54-4 HCAPLUS

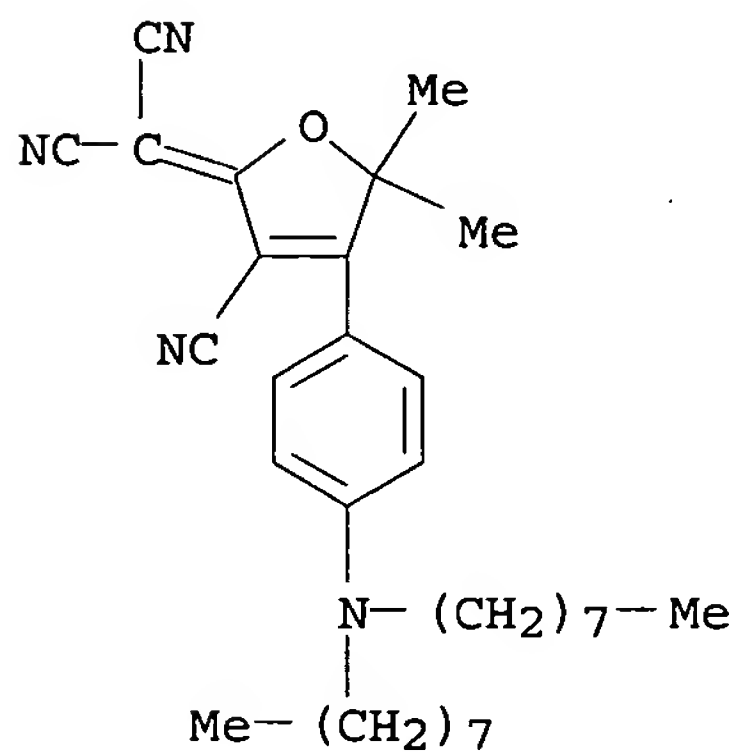


CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



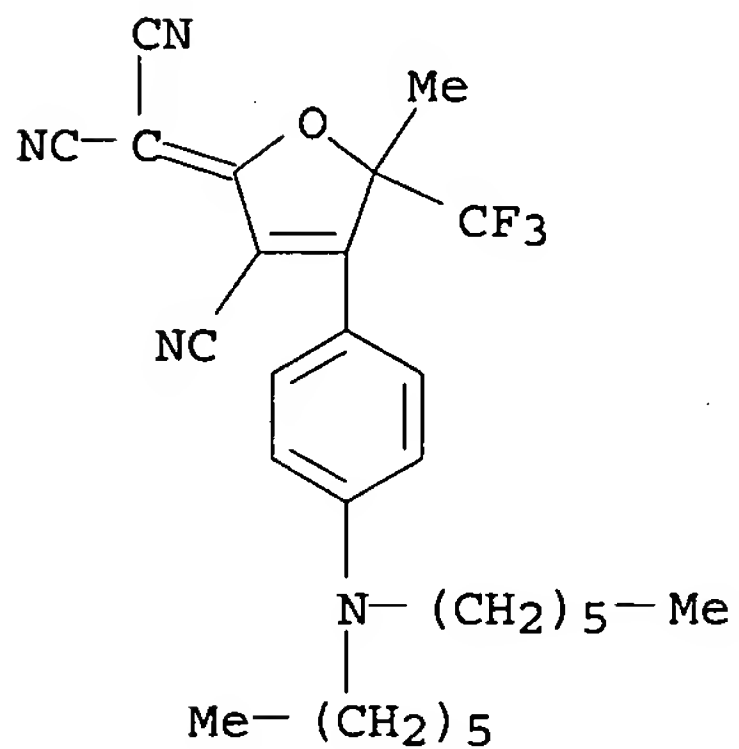
RN 481642-77-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dioctylamino)phenyl]-5,5-dimethyl-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



RN 481642-78-8 HCAPLUS

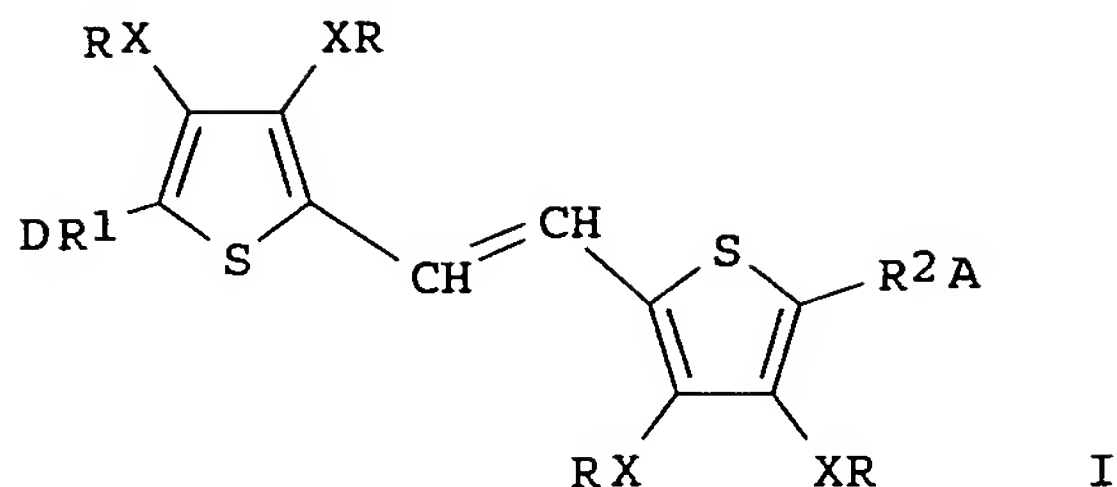
CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5-methyl-5-(  
trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 77 THERE ARE 77 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 43 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2003:454741 HCAPLUS  
 DOCUMENT NUMBER: 139:43992  
 TITLE: Second order nonlinear optical chromophores containing  
 a donor and an acceptor part linked by a  $\pi$ -bridge  
 including a substituted thiophene ring; and  
 electrooptical devices employing the chromophores  
 INVENTOR(S): Huang, Diyun; Chen, Baoquan  
 PATENT ASSIGNEE(S): Lumera Corp., USA  
 SOURCE: U.S. Pat. Appl. Publ., 15 pp., Cont.-in-part of U.S.  
 Ser. No. 932,831.  
 CODEN: USXXCO  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 5  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2003107027	A1	20030612	US 2002-301978	20021122
US 6750603	B2	20040615		
US 2002160282	A1	20021031	US 2001-932831	20010817
US 6716995	B2	20040406		
US 2003201713	A1	20031030	US 2003-387715	20030313
US 6822384	B2	20041123		
US 2003183812	A1	20031002	US 2003-395610	20030324
US 2003205701	A1	20031106	US 2003-439621	20030516
US 2004132960	A1	20040708	US 2003-625371	20030723
WO 2004048927	A2	20040610	WO 2003-US37180	20031119
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW				
RW: BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 2004192942	A1	20040930	US 2004-757375	20040114
US 2004192940	A1	20040930	US 2004-775836	20040210
PRIORITY APPLN. INFO.:				
			US 2000-226267P	P 20000817
			US 2001-932831	A2 20010817
			US 2002-301978	A1 20021122
			US 2003-395610	A2 20030324
			US 2003-625371	A2 20030723
OTHER SOURCE(S):				
GI				
MARPAT 139:43992				



AB Nonlinear optical chromophores are described by the general formula I where, independently at each occurrence: R1 is absent or a  $\pi$ -bridge; R2 is absent or a  $\pi$ -bridge; D is a donor; A is an acceptor; X is O or S; and R is an alkyl, aryl, heteroalkyl, or heteroaryl group. Nonlinear optical chromophores having the formula D- $\pi$ -A are also described, where  $\pi$  is a  $\pi$ -bridge including a thiophene ring having O atoms bonded directly to the 3 and 4 positions of the thiophene ring, D is a donor, and A is an acceptor. Second order nonlinear optical compns. comprising a polymer matrix and the nonlinear chromophores are also discussed as are electrooptical devices comprising the nonlinear optical compns.

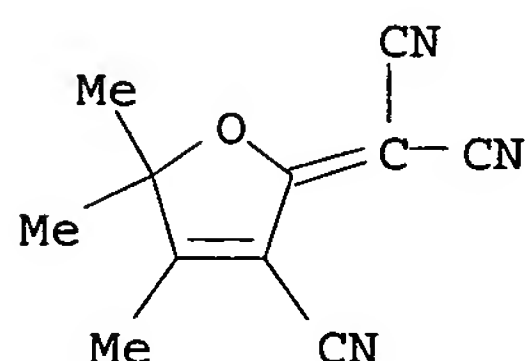
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(second-order nonlinear optical chromophores containing donor and acceptor parts linked by  $\pi$ -bridge including substituted thiophene prepared using)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA INDEX NAME)



IT 540777-76-2P 540777-77-3P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

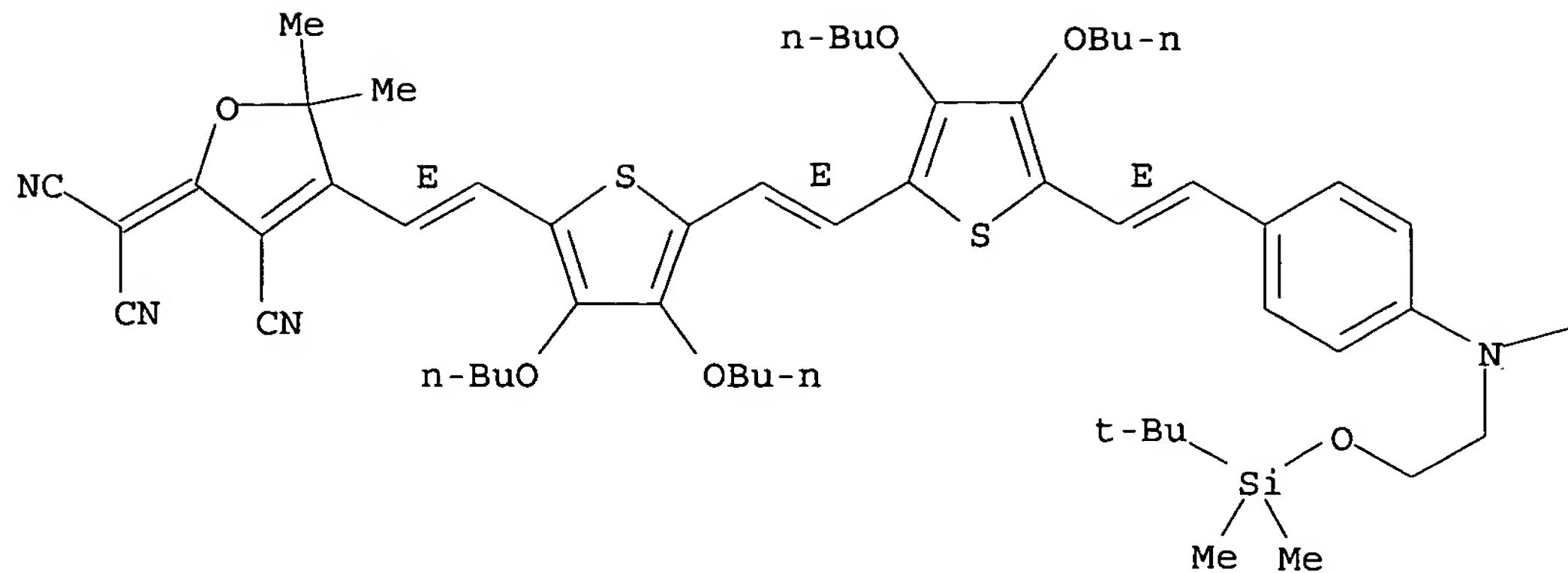
(second-order nonlinear optical chromophores containing donor and acceptor parts linked by  $\pi$ -bridge including substituted thiophene prepared using)

RN 540777-76-2 HCAPLUS

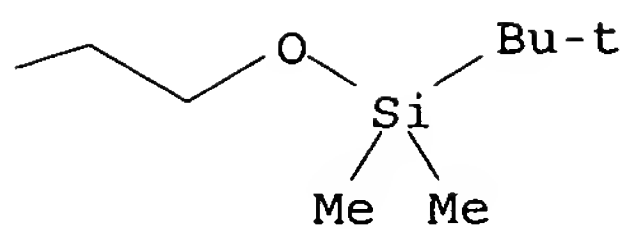
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

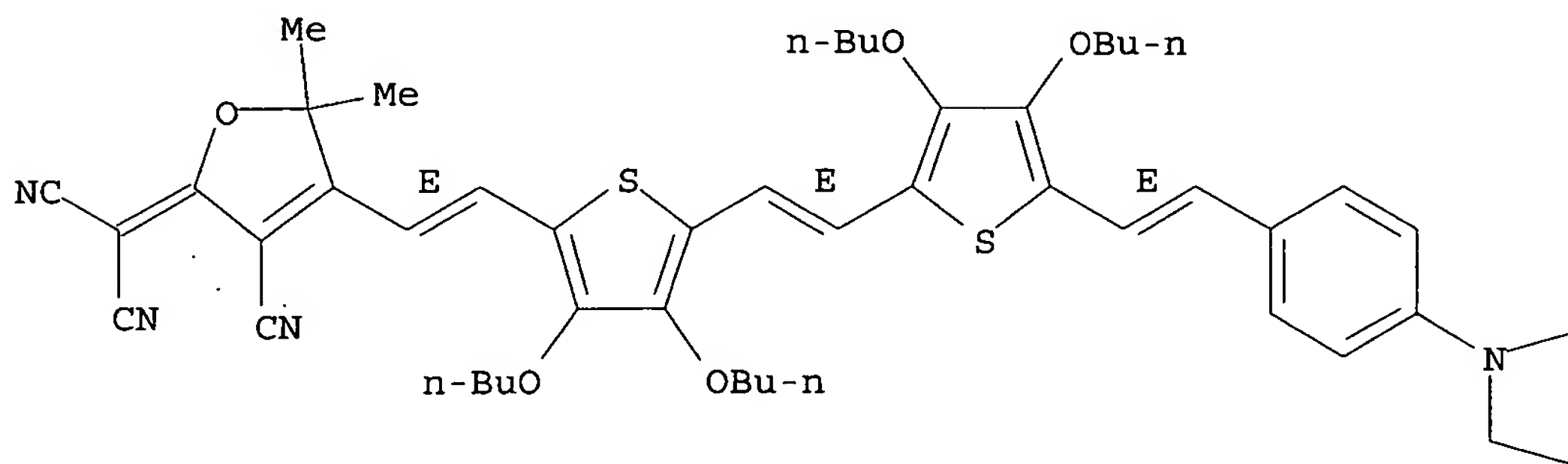


RN 540777-77-3 HCAPLUS

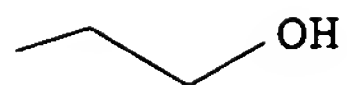
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



IT 540777-78-4P

RL: CPS (Chemical process); PEP (Physical, engineering or chemical process); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)

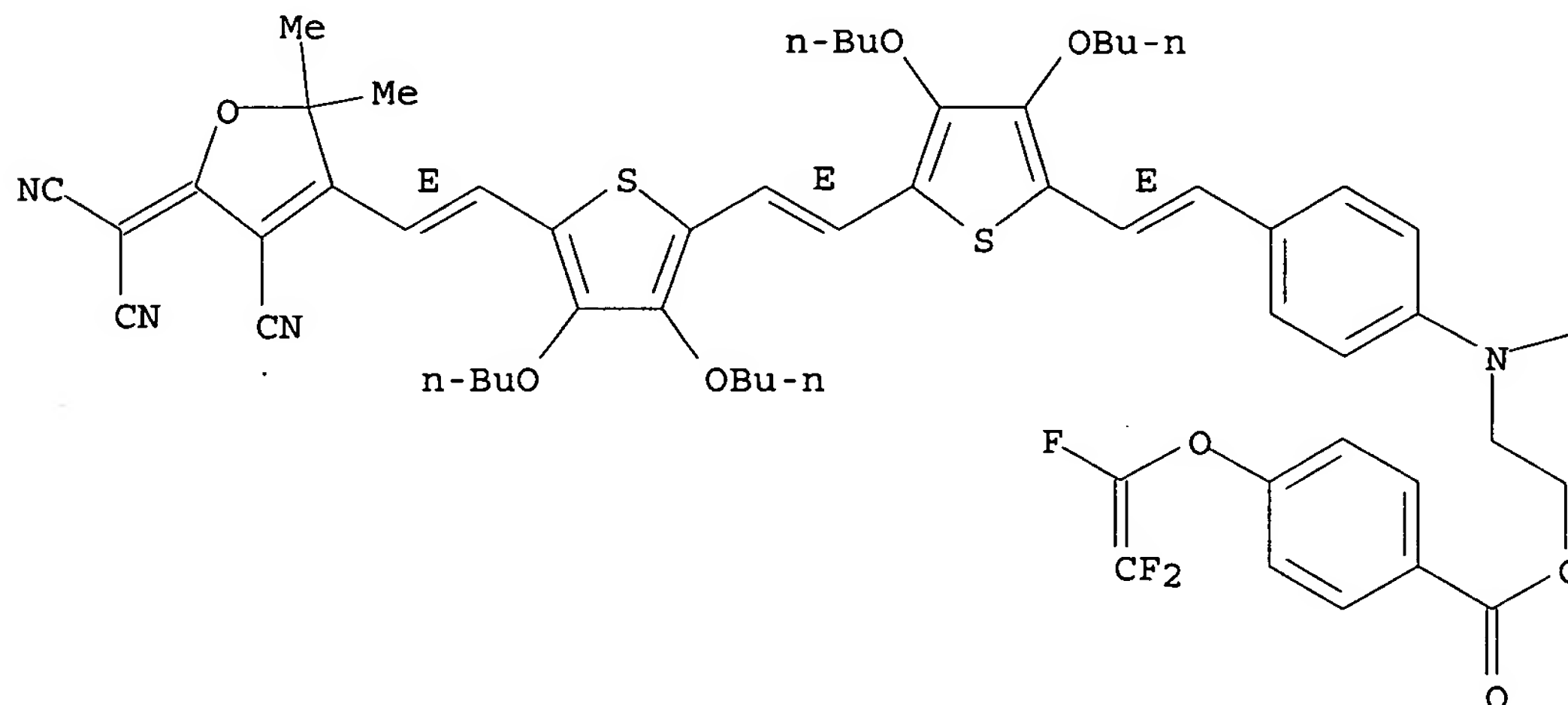
(second-order nonlinear optical chromophores containing donor and acceptor parts linked by  $\pi$ -bridge including substituted thiophene; and electrooptical devices employing chromophores)

RN 540777-78-4 HCAPLUS

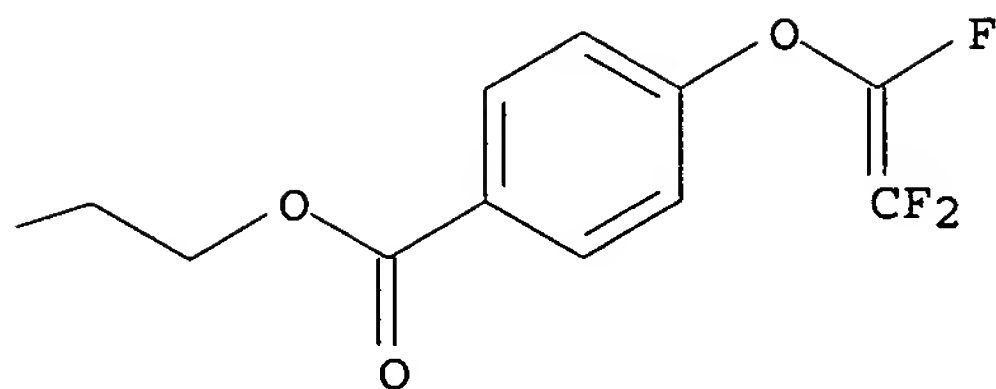
CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



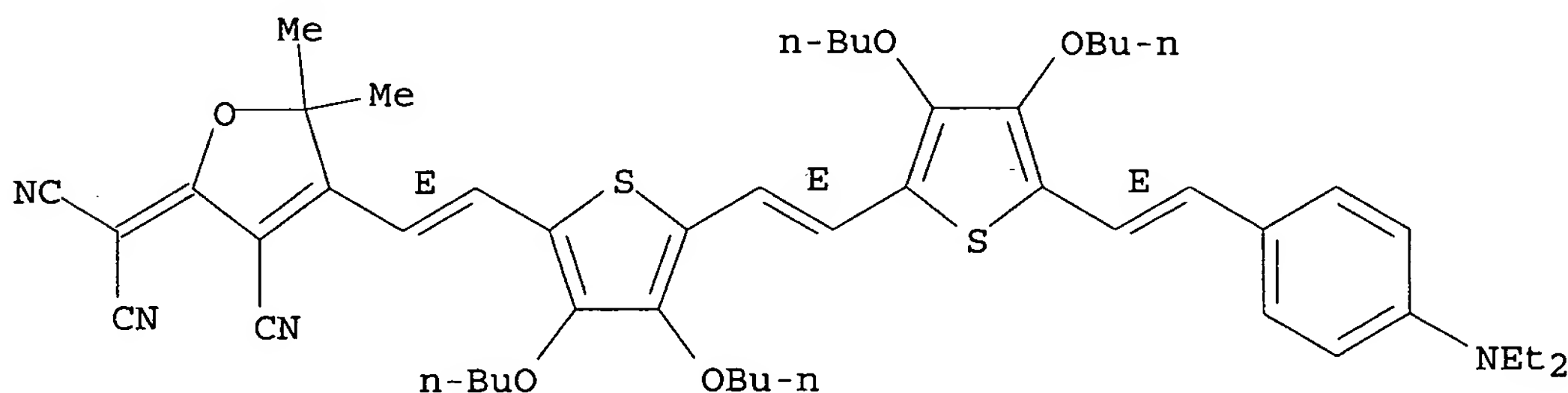
IT 540777-74-0P

RL: PEP (Physical, engineering or chemical process); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)  
 (second-order nonlinear optical chromophores containing donor and acceptor parts linked by  $\pi$ -bridge including substituted thiophene; and electrooptical devices employing chromophores)

RN 540777-74-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 53 THERE ARE 53 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 44 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:421608 HCAPLUS

DOCUMENT NUMBER: 139:214850

TITLE: Synthesis and properties of chiral helical chromophore-functionalized polybinaphthalenes for second-order nonlinear optical applications  
 AUTHOR(S): Koeckelberghs, Guy; Sioncke, Sonja; Verbiest, Thierry; Persoons, Andre; Samyn, Celest

CORPORATE SOURCE: Laboratory of Macromolecular and Physical Organic Chemistry, Katholieke Universiteit Leuven, Heverlee, B-3001, Belg.

SOURCE: Polymer (2003), 44(14), 3785-3794  
 CODEN: POLMAG; ISSN: 0032-3861

PUBLISHER: Elsevier Science Ltd.

DOCUMENT TYPE: Journal

LANGUAGE: English

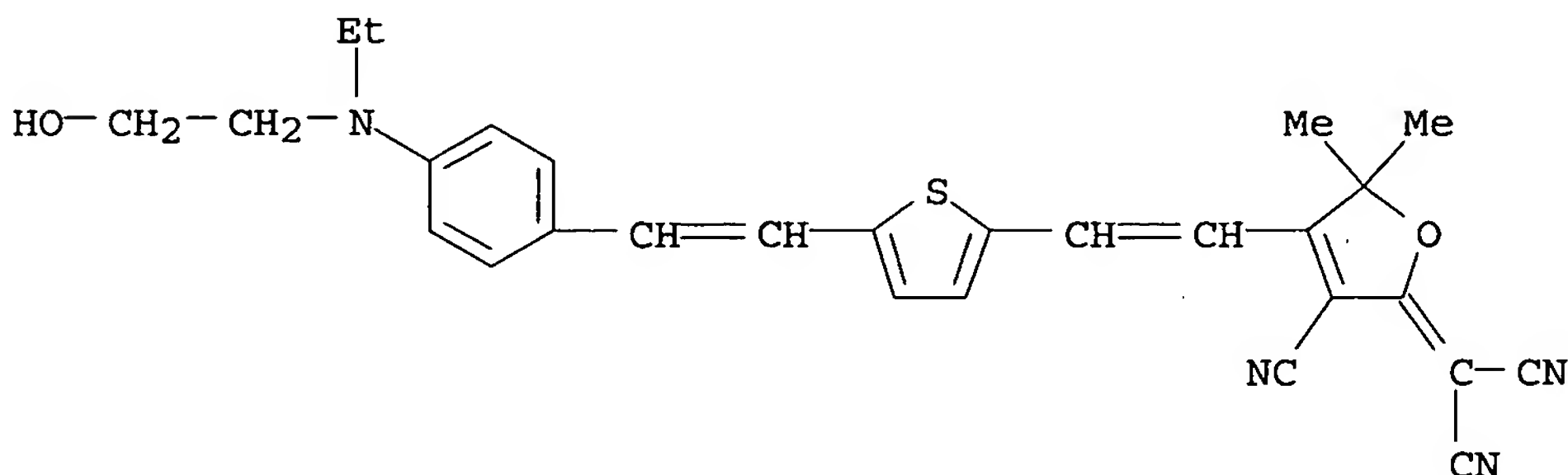
AB Chiral, helical, nonlinear optical polybinaphthalenes were prepared by

covalent bonding of chromophores to the backbone of polybinaphthalenes via a Mitsunobu reaction. This was achieved in a two-step reaction, with the formation of a precursor polymer by a Suzuki coupling reaction, which was afterwards functionalized with chromophores. It was tried to achieve a chiral ordering of the chromophores by attaching them to a chiral, helical polymer backbone. Poled films of the polymers were measured for their second-harmonic generation effect and showed nonresonant nonlinear susceptibilities ( $\chi_{zzz}(2)(0)$ ) up to 10.6 pm/V.

IT 586972-36-3DP, reaction product with chiral polybinaphthalenes  
586972-37-4DP, reaction product with chiral polybinaphthalenes  
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(chiral helical chromophore-functionalized polybinaphthalenes synthesis)

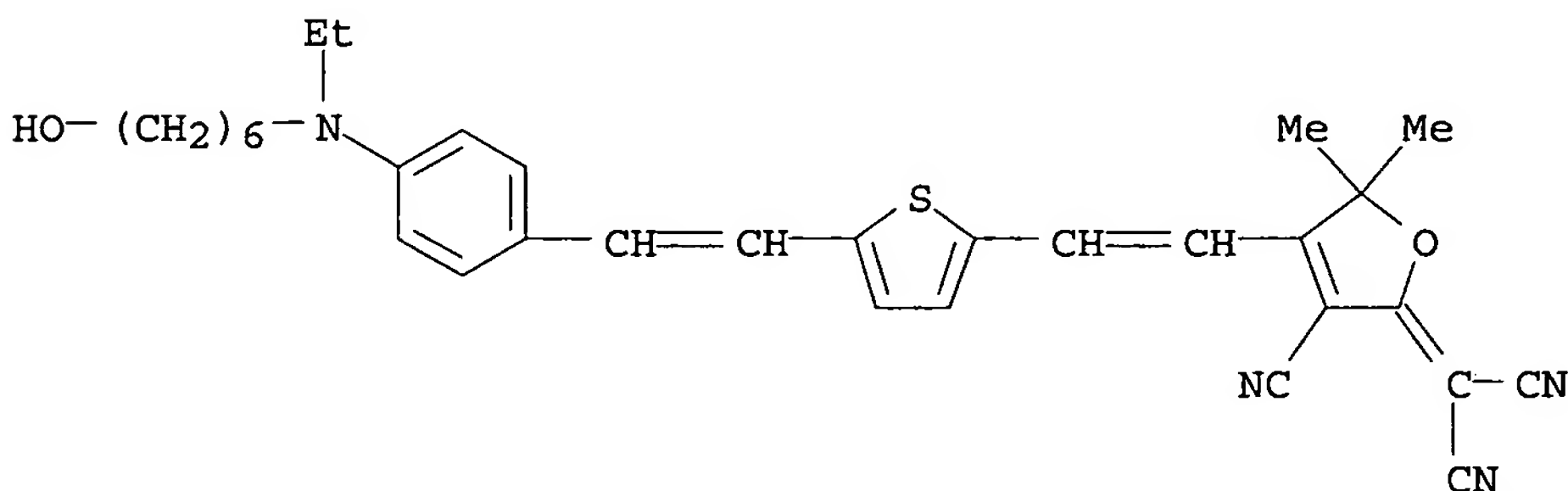
RN 586972-36-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[2-[4-[ethyl(2-hydroxyethyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 586972-37-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[2-[4-[ethyl(6-hydroxyhexyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

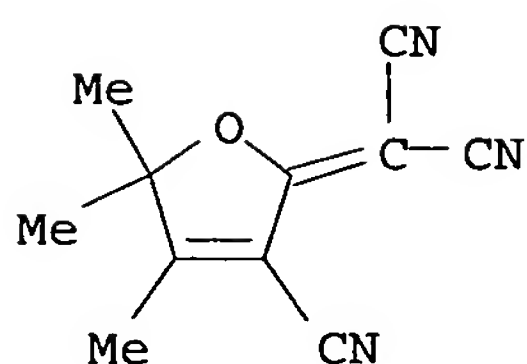


IT 171082-32-9P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(chiral helical chromophore-functionalized polybinaphthalenes synthesis)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanlydene)- (9CI) (CA INDEX NAME)



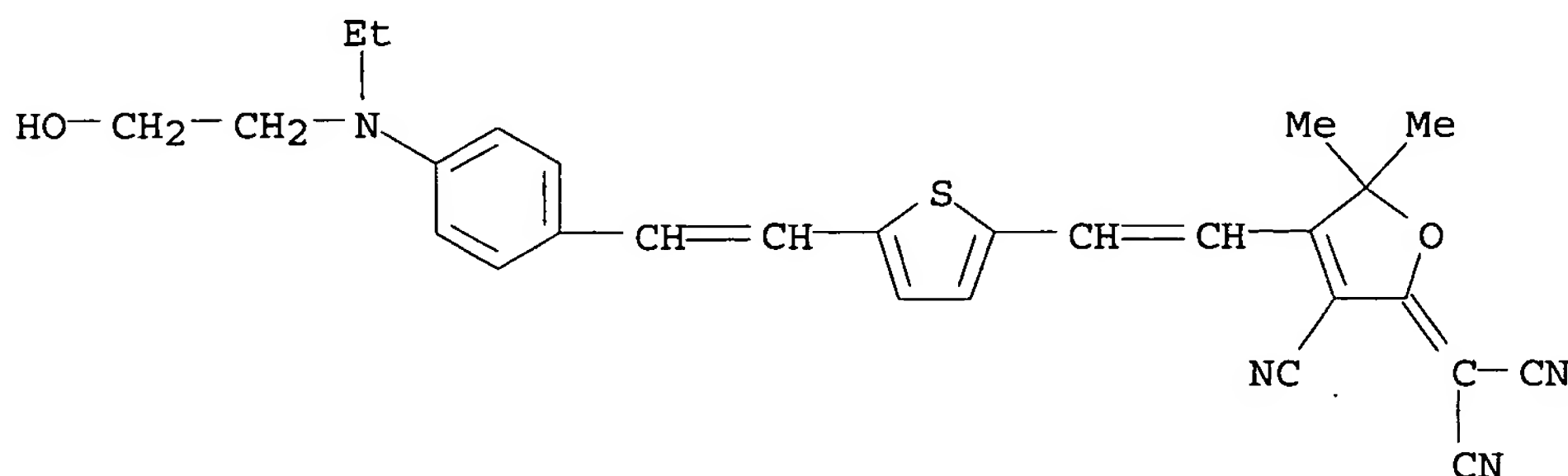
IT 586972-36-3P 586972-37-4P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(chromophore; chiral helical chromophore-functionalized polybinaphthalenes synthesis)

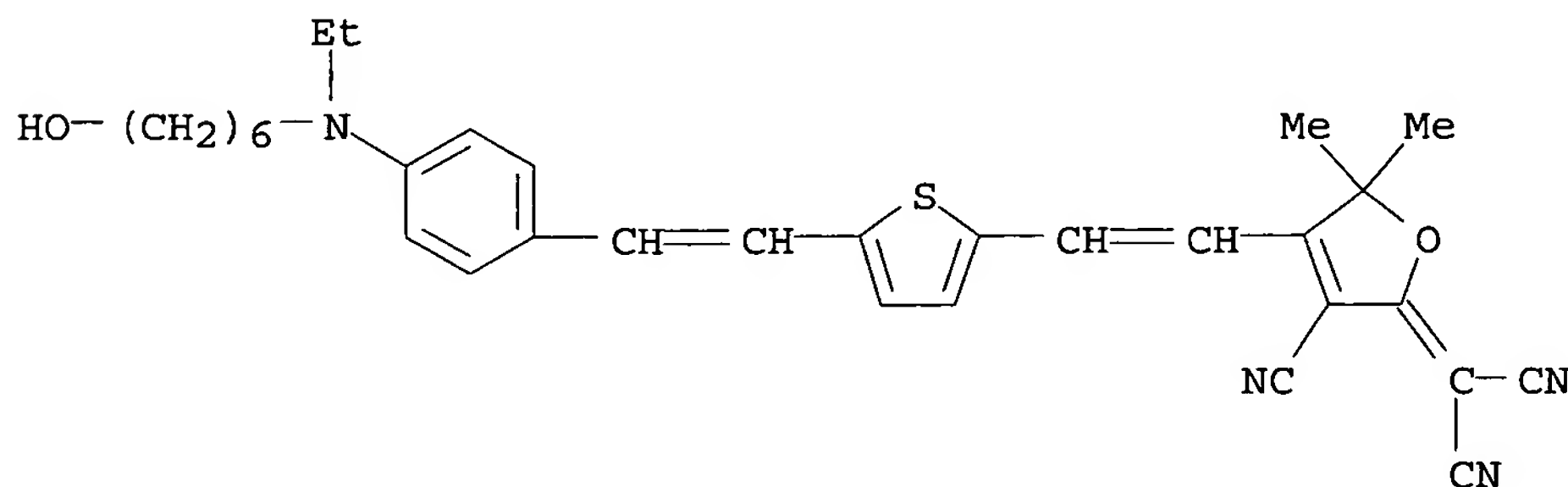
RN 586972-36-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[2-[4-[ethyl(2-hydroxyethyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 586972-37-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[2-[4-[ethyl(6-hydroxyhexyl)amino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 21 THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 45 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:402555 HCAPLUS

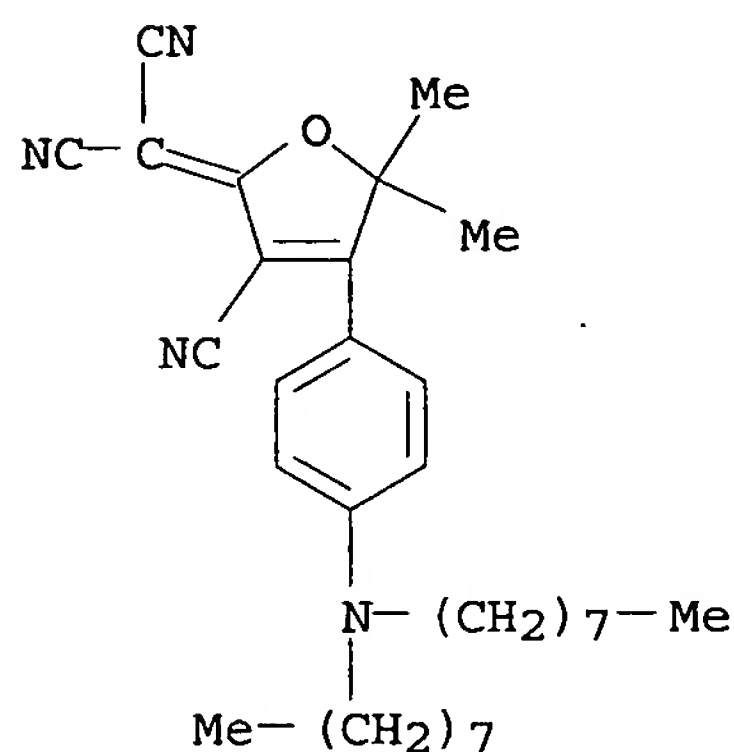
DOCUMENT NUMBER: 139:124648

TITLE: High-performance photorefractive organic glass with near-infrared sensitivity

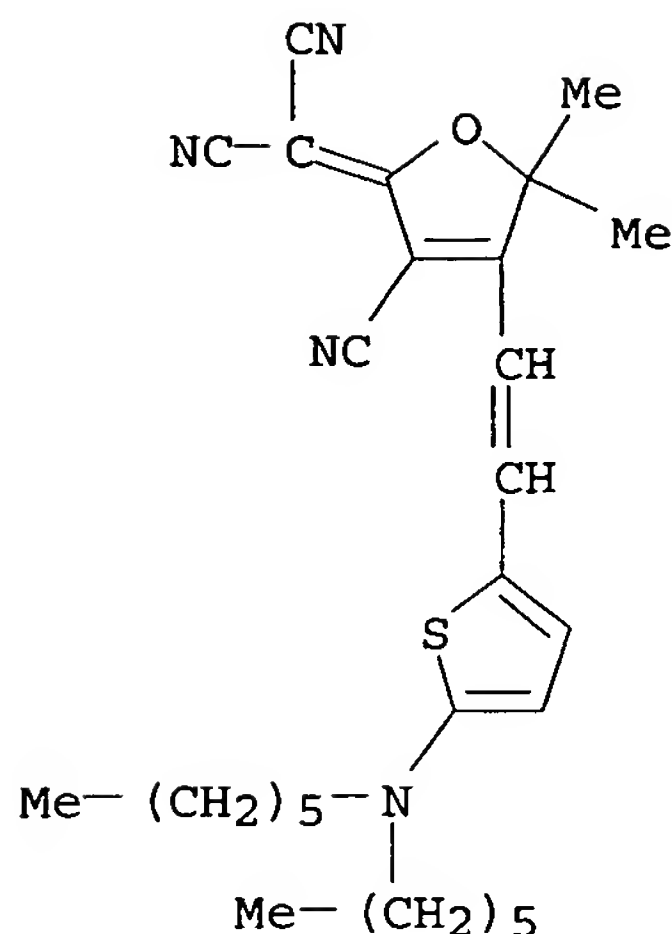
AUTHOR(S): Ostroverkhova, Oksana; Moerner, W. E.; He, Meng;



CORPORATE SOURCE: Twieg, Robert J.  
 Department of Chemistry, Stanford University,  
 Stanford, CA, 94305-5080, USA  
 SOURCE: Applied Physics Letters (2003), 82(21), 3602-3604  
 CODEN: APPLAB; ISSN: 0003-6951  
 PUBLISHER: American Institute of Physics  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB A high-performance organic glass mixture comprised of two  
 dicyanomethylenedihydrofuran derivs. is presented. A pronounced two-beam  
 coupling effect was observed at a wavelength of 830 nm in an unsensitized  
 composition. Sensitization with (2,4,7-trinitro-9-fluorenylidene)malononitrile  
 (TNFM) led to a significant increase in the two-beam coupling gain coefficient,  
 reaching a net value of .apprx.370 cm<sup>-1</sup> at an elec. field of 45 V/μm at  
 1% TNFM, and resulted in an improvement in photorefractive speed.  
 IT 481642-77-7, DCDHF 8 561291-76-7, TH-DCDHF 6V  
 RL: PRP (Properties)  
 (high-performance photorefractive organic glass with near-IR sensitivity  
 and its properties)  
 RN 481642-77-7 HCAPLUS  
 CN Propanedinitrile, [3-cyano-4-[4-(dioctylamino)phenyl]-5,5-dimethyl-2(5H)-  
 furanylidene]- (9CI) (CA INDEX NAME)



RN 561291-76-7 HCAPLUS  
 CN Propanedinitrile, [3-cyano-4-[2-[5-(dihexylamino)-2-thienyl]ethenyl]-5,5-  
 dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 46 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:380574 HCAPLUS

DOCUMENT NUMBER: 139:107824

TITLE: Fine-tuning photorefractive properties of monolithic molecular materials

AUTHOR(S): Hou, Zhanjia; You, Wei; Yu, Luping

CORPORATE SOURCE: Department of Chemistry and The James Franck Institute, The University of Chicago, Chicago, IL, 60637, USA

SOURCE: Applied Physics Letters (2003), 82(20), 3385-3387  
CODEN: APPLAB; ISSN: 0003-6951

PUBLISHER: American Institute of Physics

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Single component photorefractive materials based on small mols. have been synthesized. The side chains located in the electron-withdrawing group of these mols. were systematically changed in order to investigate their influence. It was demonstrated that the photorefractive performance of these materials could be fine-tuned by changing the length of the side chain. Excellent optical quality and photorefractive properties were obtained. A large net optical gain of 280 cm<sup>-1</sup> at a low external field (38.3 V/μm) and a diffraction efficiency of 82% were observed at 780 nm. The results indicate that an optimum side chain length exists for this type of mols.

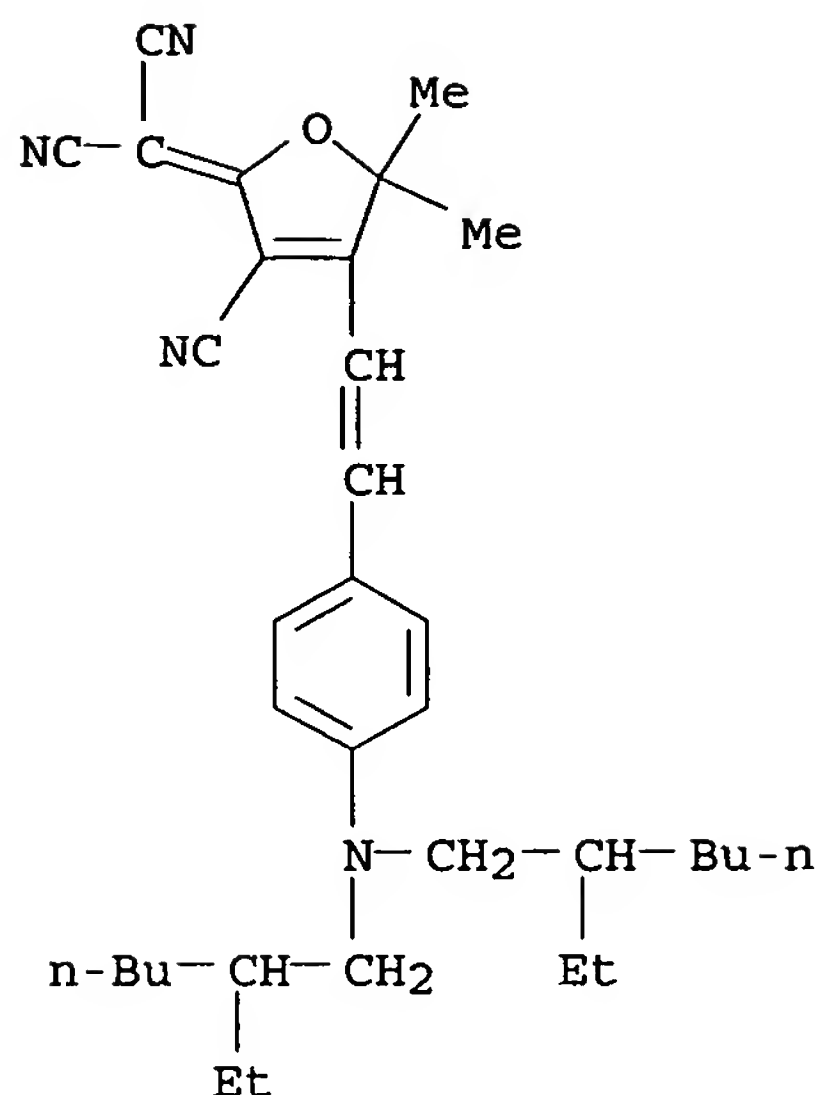
IT 481642-79-9 560107-74-6 560107-75-7  
560107-76-8

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)

(optical and thermal and photorefractive properties of monolithic mol. materials containing tricyano-substituted furan acceptor group)

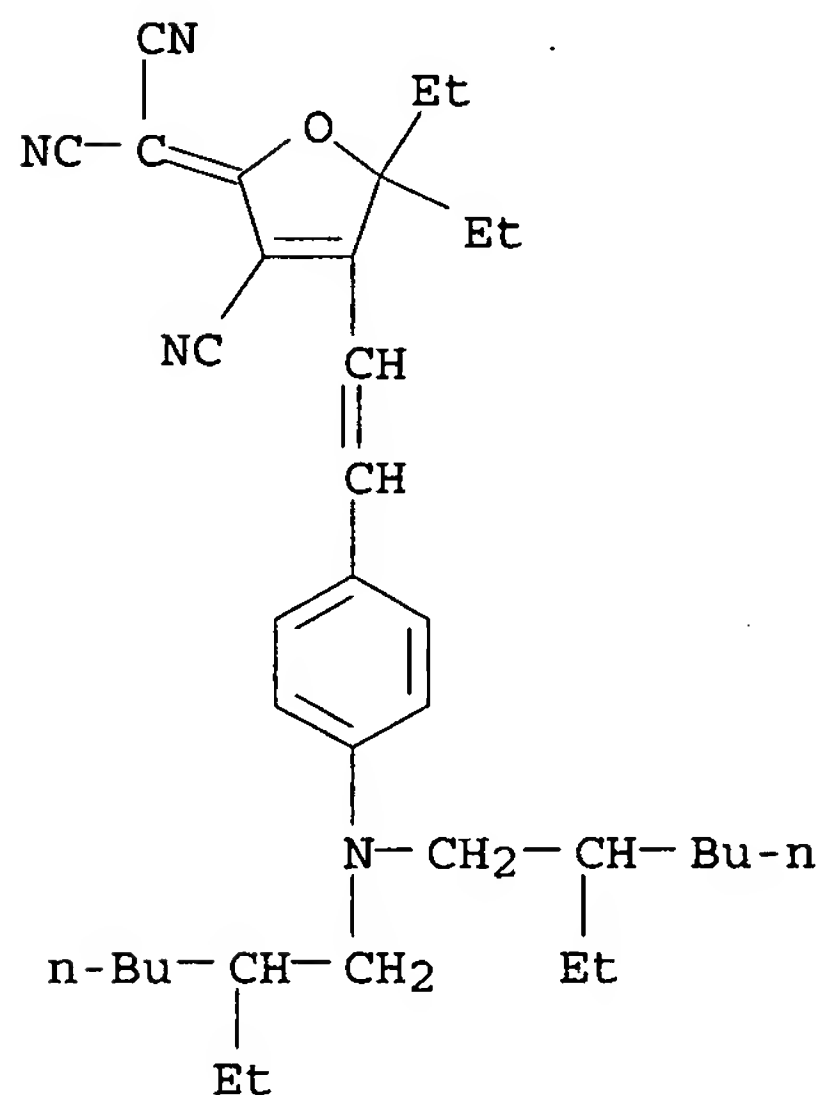
RN 481642-79-9 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



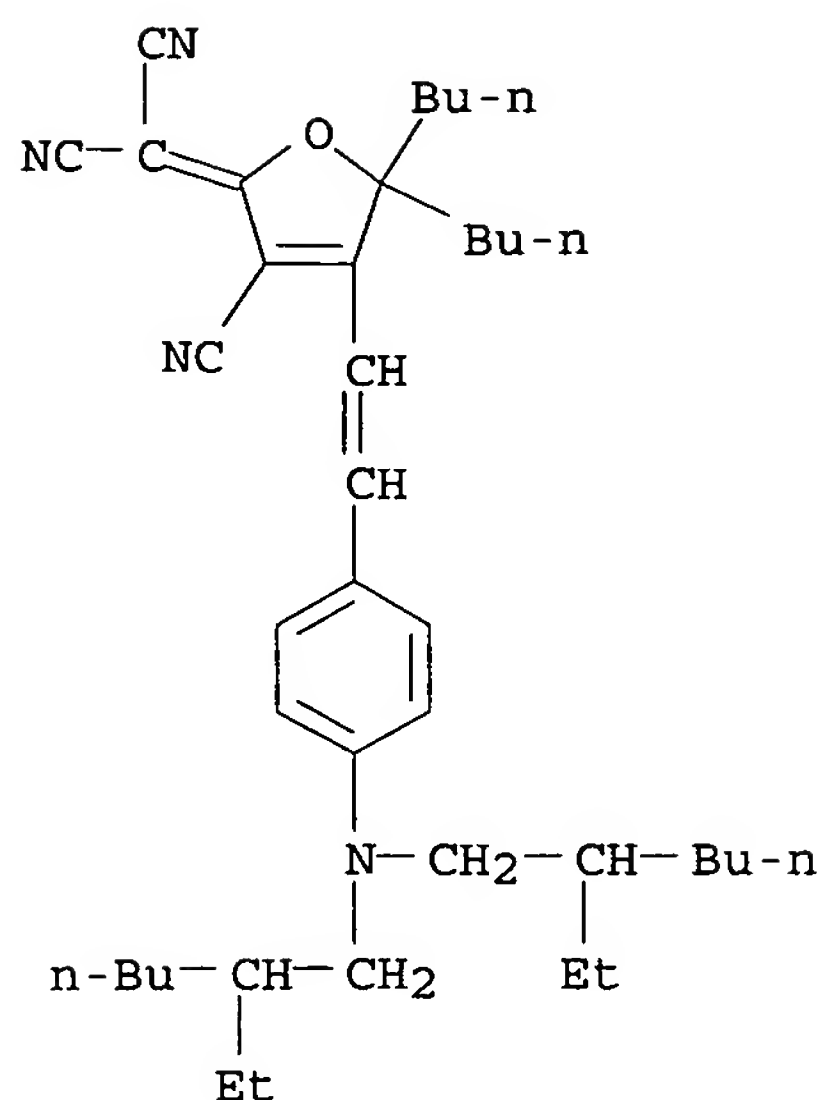
RN 560107-74-6 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-diethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



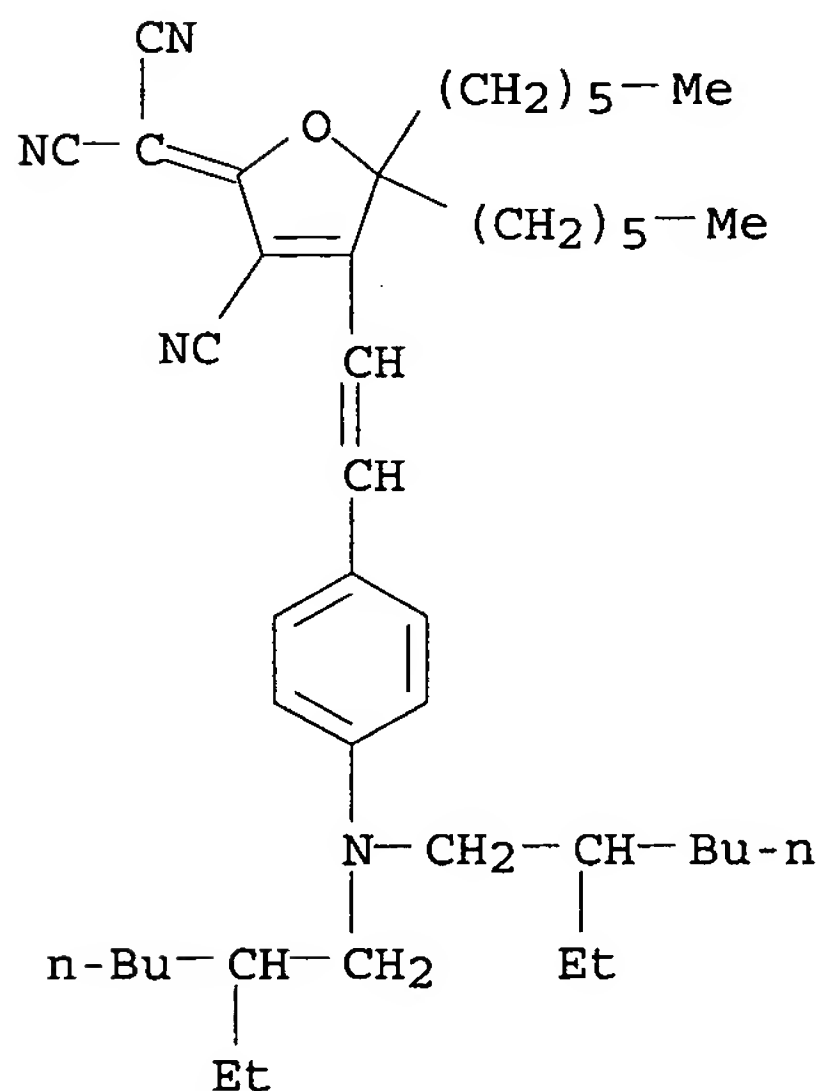
RN 560107-75-7 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 560107-76-8 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-dihexyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 47 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

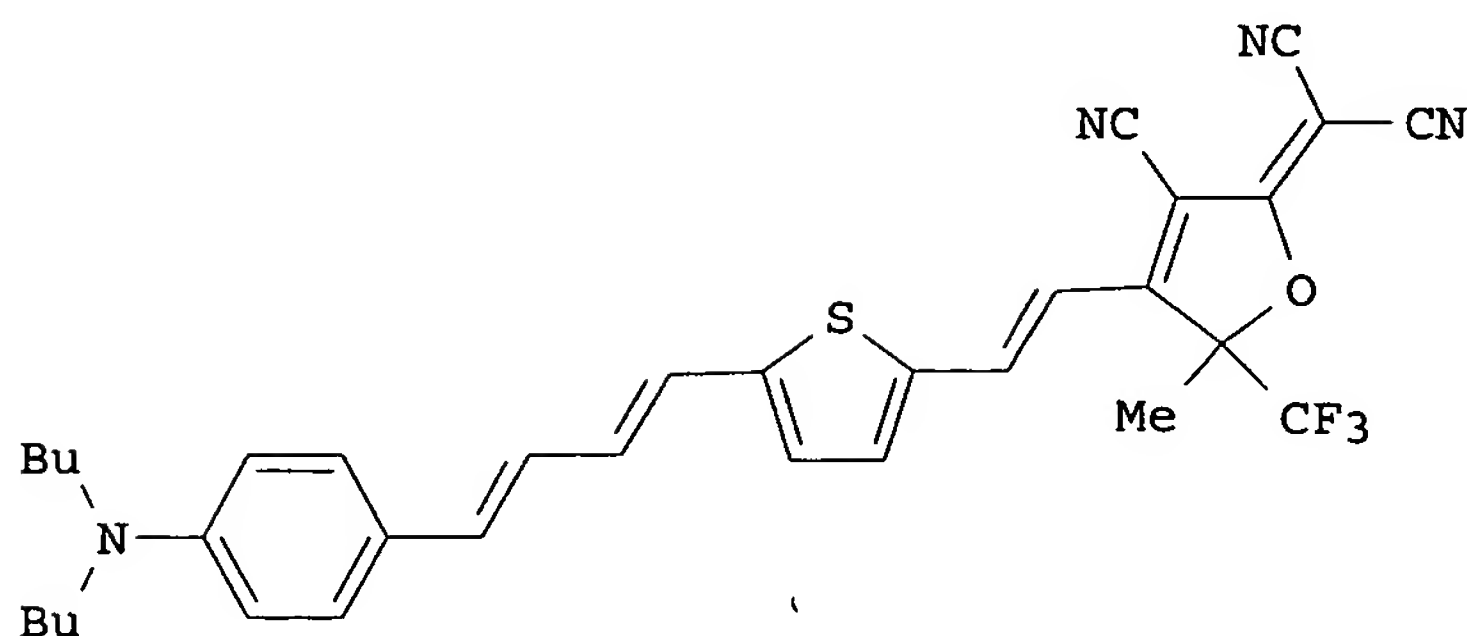
ACCESSION NUMBER: 2003:338986 HCAPLUS

DOCUMENT NUMBER: 139:323382

TITLE: Focused microwave-assisted synthesis of 2,5-dihydrofuran derivatives as electron acceptors for highly efficient nonlinear optical chromophores

AUTHOR(S): Liu, Sen; Haller, Marnie A.; Ma, Hong; Dalton, Larry

CORPORATE SOURCE: R.; Jang, Sei-Hum; Jen, Alex K.-Y.  
 Department of Materials Science and Engineering,  
 University of Washington, Seattle, WA, 98195-2120, USA  
 SOURCE: Advanced Materials (Weinheim, Germany) (2003),  
 15(7-8), 603-607  
 CODEN: ADVMEW; ISSN: 0935-9648  
 PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 OTHER SOURCE(S): CASREACT 139:323382  
 GI



AB A very diversified family of 2,5-dihydrofuran derivs., e.g., I, was prepared as a new class of tunable electron acceptors using single-mode focused microwave irradiation. A high poling efficiency and very large  $r_{33}$  values (128 and 116 pm V<sup>-1</sup> at 1.3  $\mu$ m) were demonstrated using I in polymethyl methacrylate and a high-temperature polyquinoline (PQ-100). An excellent long-term temporal stability was demonstrated in the PQ guest/host system.

IT 613237-39-1P 613237-40-4P 613237-41-5P

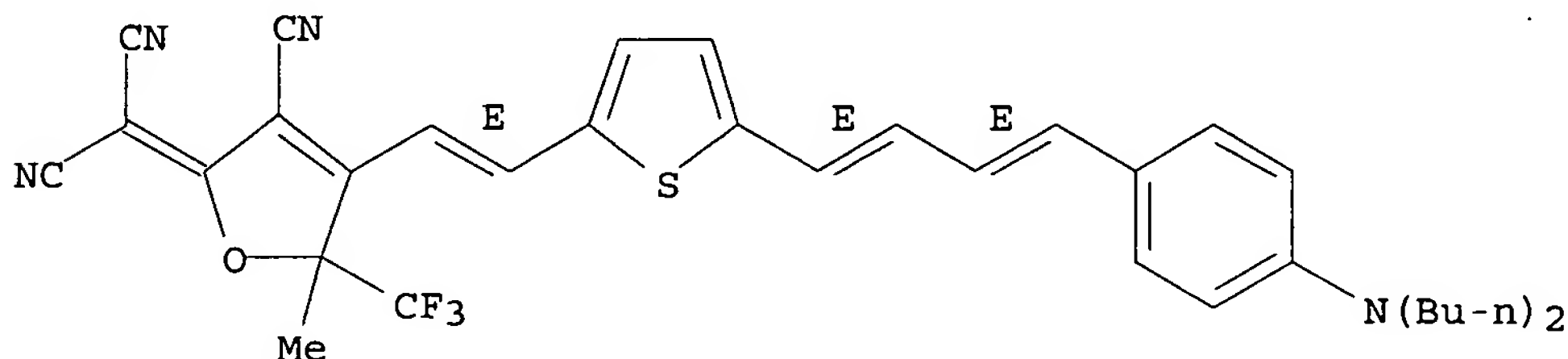
RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for nonlinear optical chromophores)

RN 613237-39-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

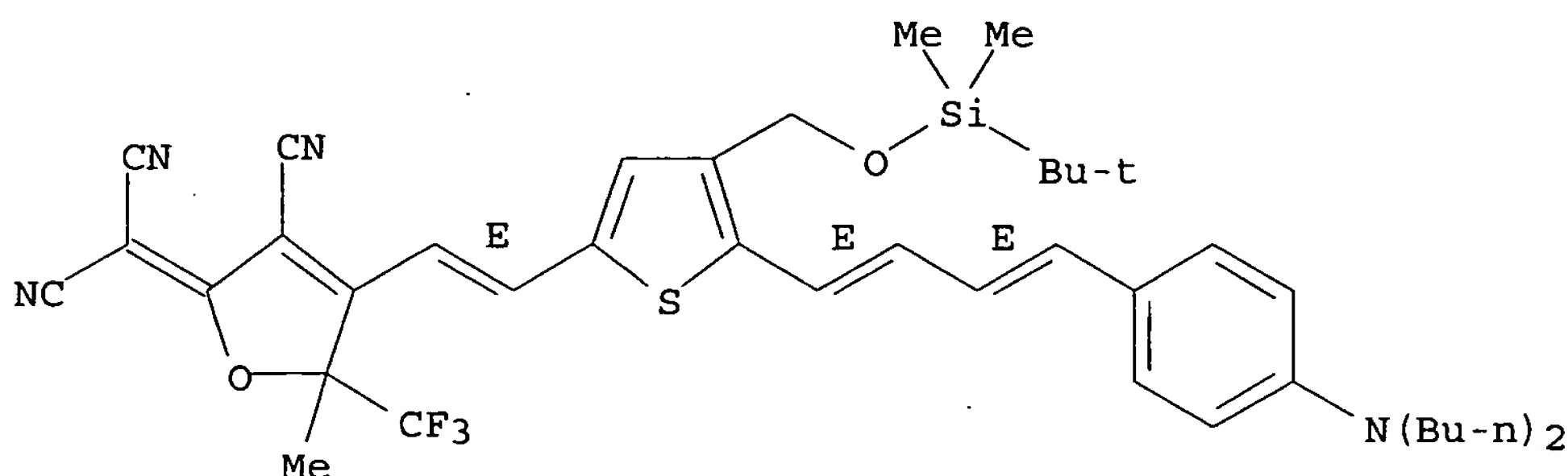


RN 613237-40-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-

(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

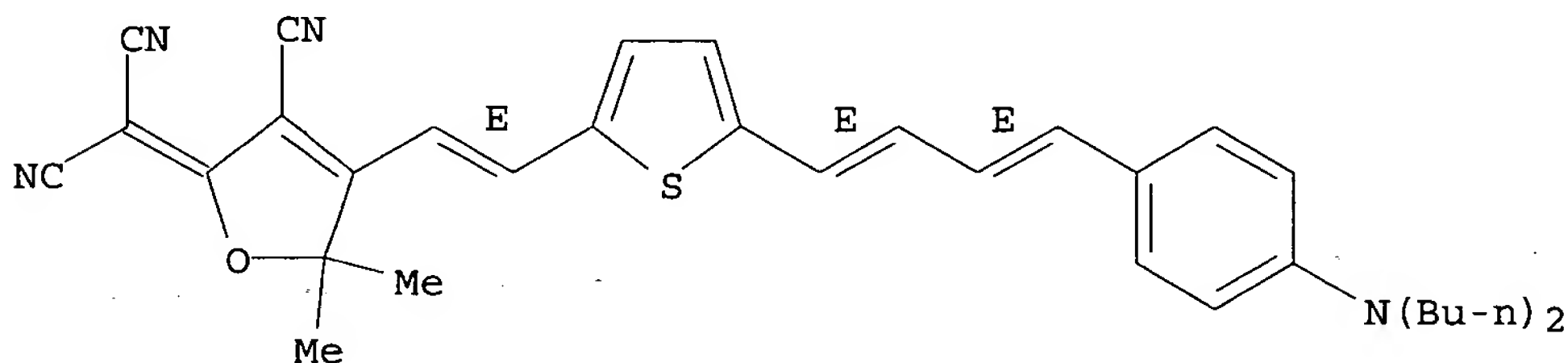
Double bond geometry as shown.



RN 613237-41-5 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 613237-43-7 613237-44-8

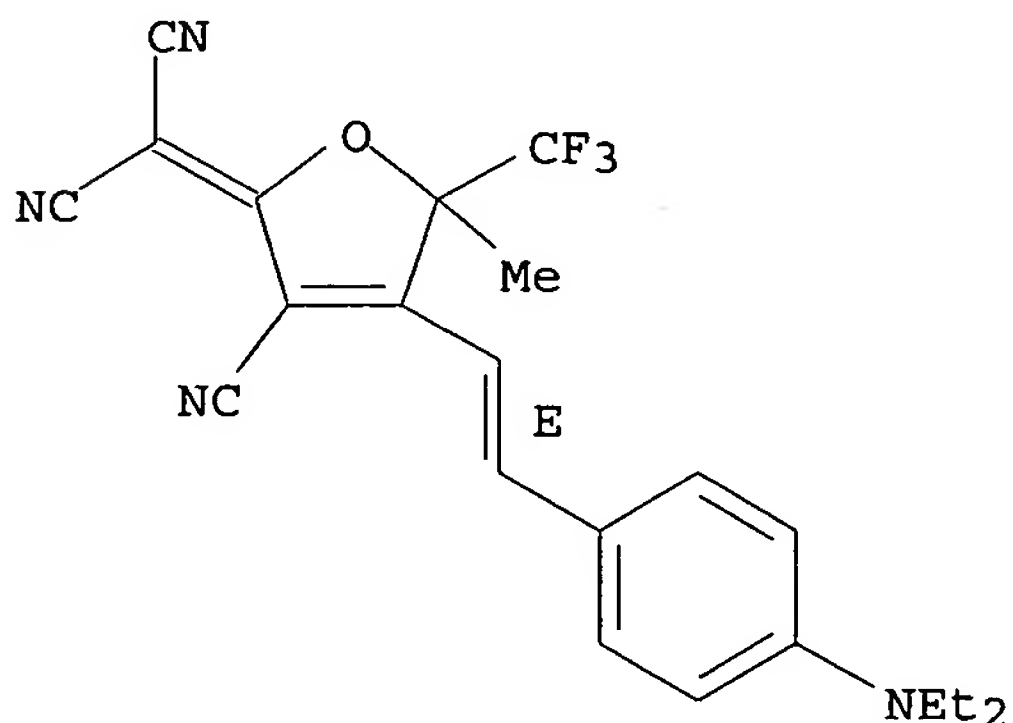
RL: PRP (Properties)

(focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for nonlinear optical chromophores)

RN 613237-43-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

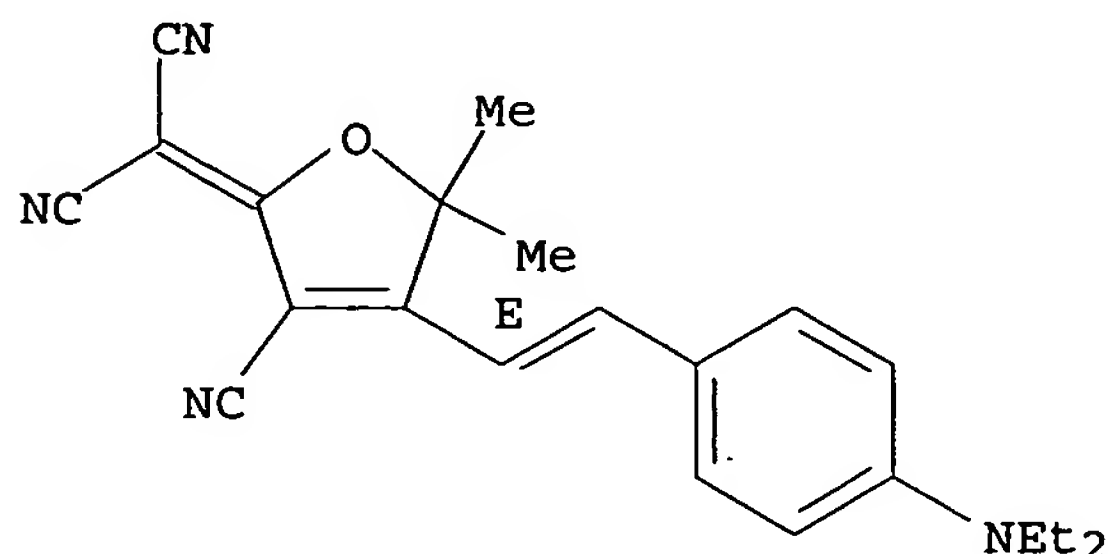
Double bond geometry as shown.



RN 613237-44-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



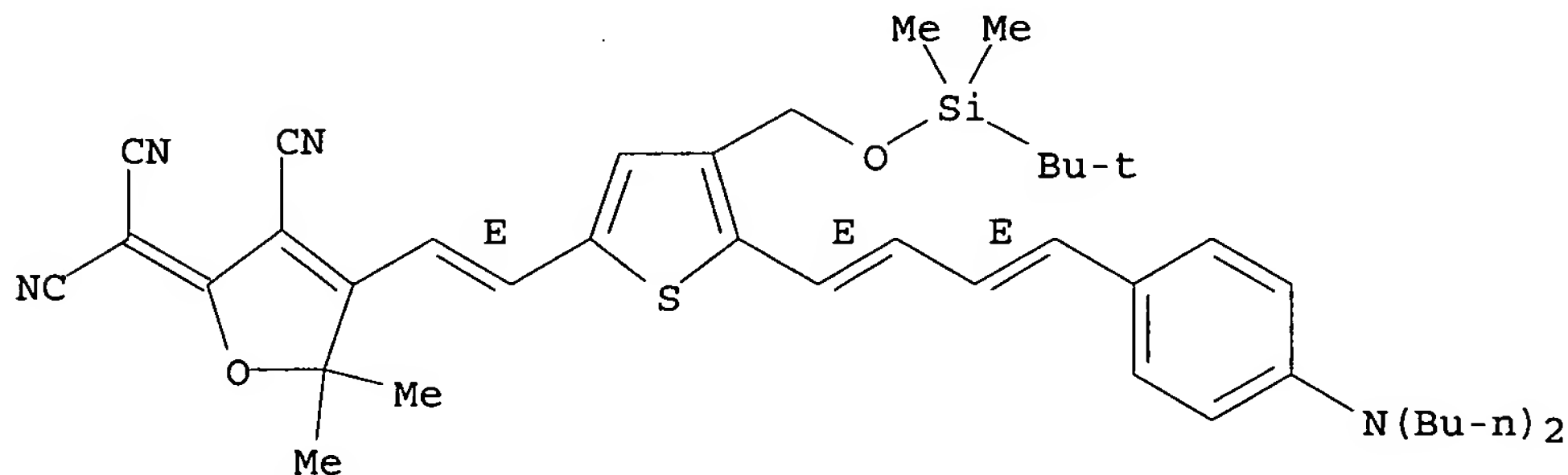
IT 613237-42-6P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as  
 electron acceptors for nonlinear optical chromophores)

RN 613237-42-6 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E,3E)-4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

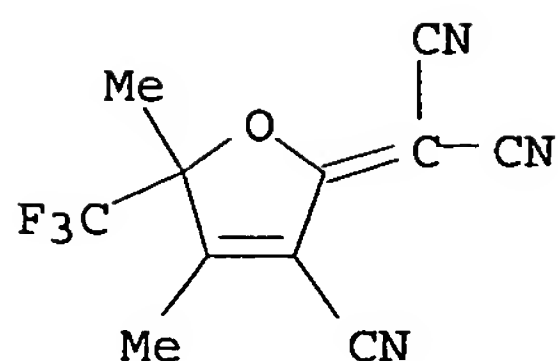


IT 369609-49-4P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
 (Reactant or reagent)  
 (intermediate, reaction with thiophenecarboxaldehyde derivative; focused  
 microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron  
 acceptors for nonlinear optical chromophores)

RN 369609-49-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



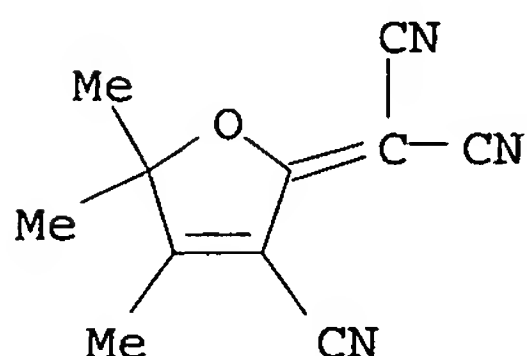
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(prereactant with thiophenecarboxaldehyde derivative; focused microwave-assisted synthesis of 2,5-dihydrofuran derivs. as electron acceptors for nonlinear optical chromophores)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 25 THERE ARE 25 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 48 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:301346 HCAPLUS

DOCUMENT NUMBER: 138:322077

TITLE: Crosslinkable monomers for novel nonlinear optical polymers

INVENTOR(S): Yu, Luping

PATENT ASSIGNEE(S): The University of Chicago, USA

SOURCE: PCT Int. Appl., 58 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 4

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003032072	A2	20030417	WO 2002-US22531	20020715
WO 2003032072	A3	20031218		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				



US 2003086666	A1	20030508	US 2002-196328	20020715
US 2003085388	A1	20030508	US 2002-196734	20020715
US 2003092869	A1	20030515	US 2002-196565	20020715
US 2003100681	A1	20030529	US 2002-196353	20020715
PRIORITY APPLN. INFO.:			US 2001-305374P	P 20010713

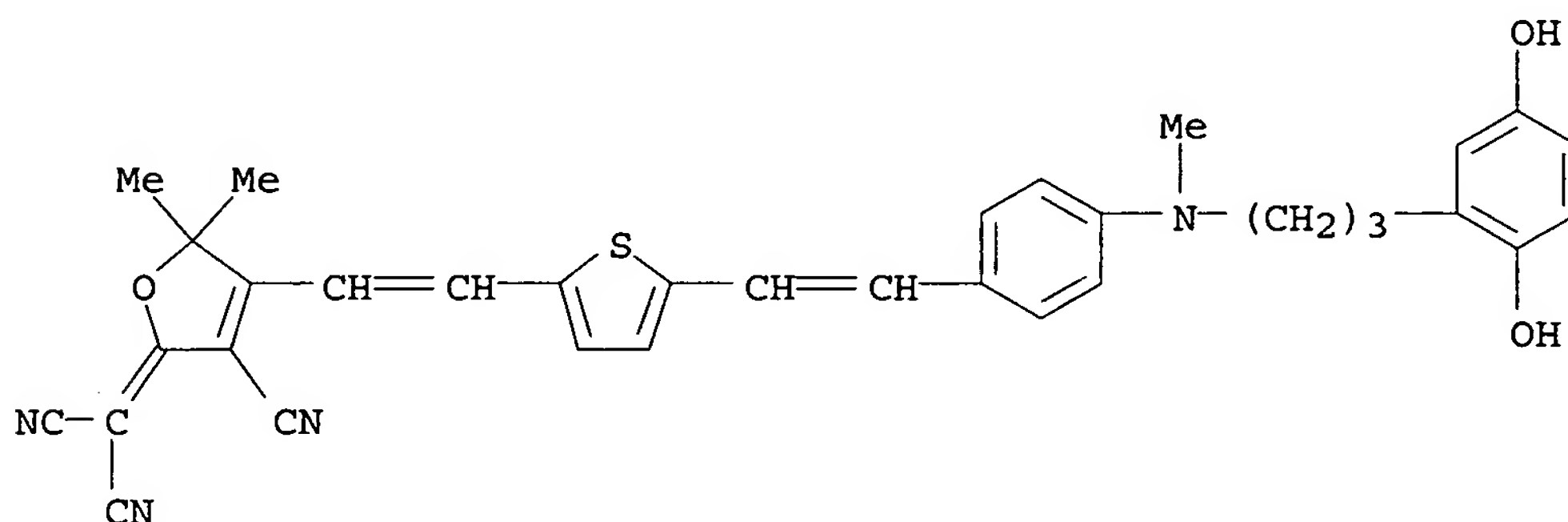
AB Novel compns. and synthetic methods for forming nonlinear optic polymers, which may be incorporated into multiple light-based devices, are disclosed. These compns. include crosslinkable chromophoric monomer units that incorporate nonlinear optic chromophores, linking monomers that may be used to link chromophoric monomers, and polymers made from crosslinkable chromophoric monomers or chromophoric monomers in combination with linking monomers. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures. In one aspect, linking monomers are disclosed that may be crosslinked.

IT 488809-62-7P

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(monomers; synthesis of crosslinkable monomers for novel nonlinear optical polymers)

RN 488809-62-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[2-[4-[[3-(2,5-dihydroxyphenyl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



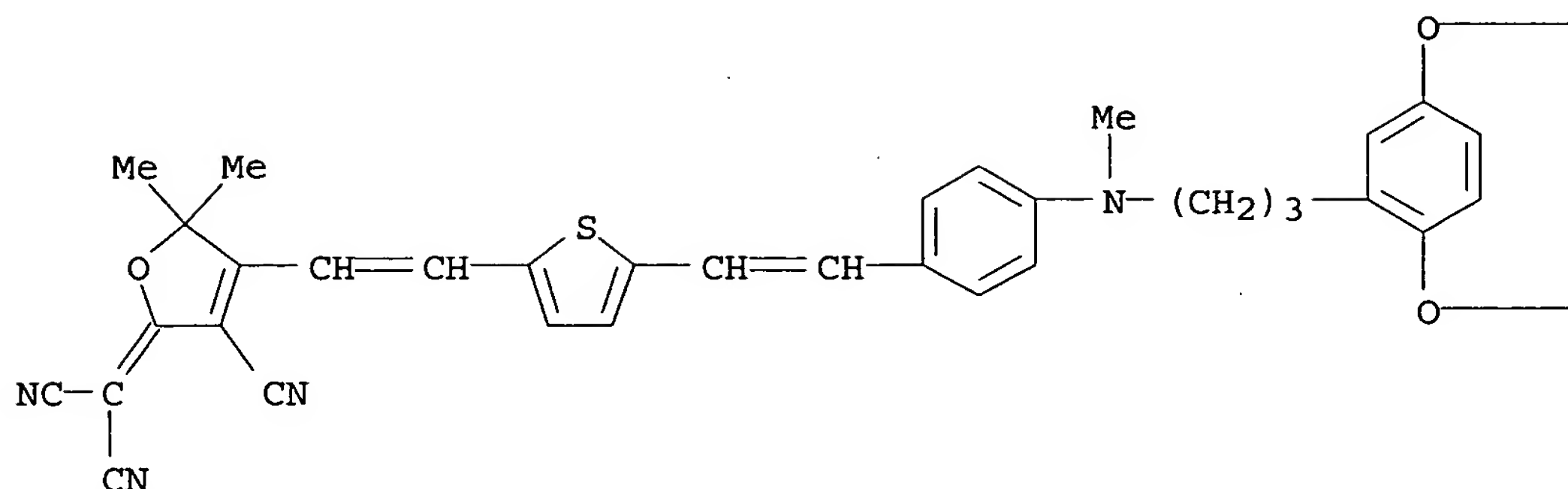
IT 511535-61-8

RL: RCT (Reactant); RACT (Reactant or reagent)  
(starting materials; synthesis of crosslinkable monomers for novel nonlinear optical polymers)

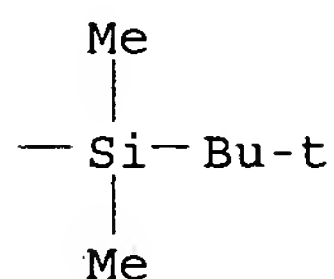
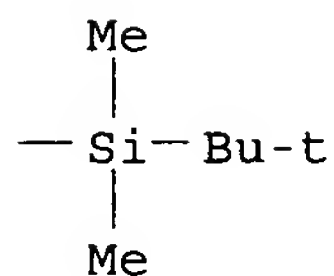
RN 511535-61-8 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[4-[[3-[2,5-bis[[1,1-dimethylethyl]dimethylsilyl]oxy]phenyl]propyl]methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



IT 488809-63-8P

RL: IMF (Industrial manufacture); PRP (Properties); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(synthesis of crosslinkable monomers for novel nonlinear optical polymers)

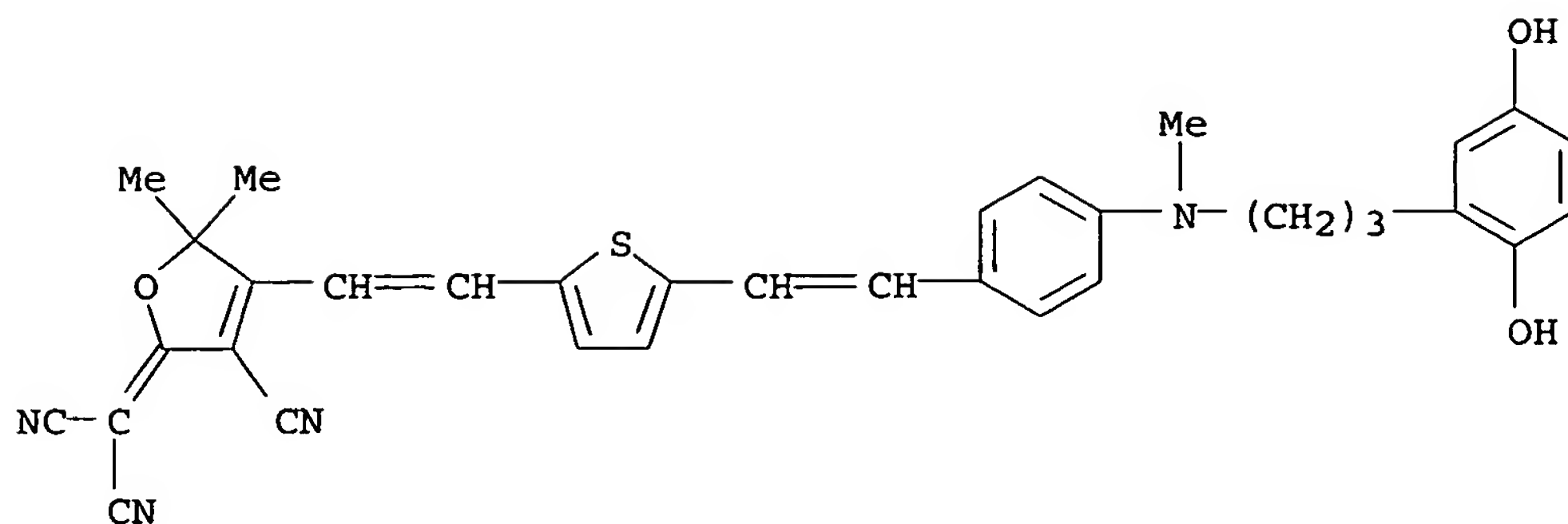
RN 488809-63-8 HCAPLUS

CN Benzoic acid, 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(1,3-dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)]bis-, polymer with [3-cyano-4-[2-[5-[2-[4-[[3-(2,5-dihydroxyphenyl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile (9CI) (CA INDEX NAME)

CM 1

CRN 488809-62-7

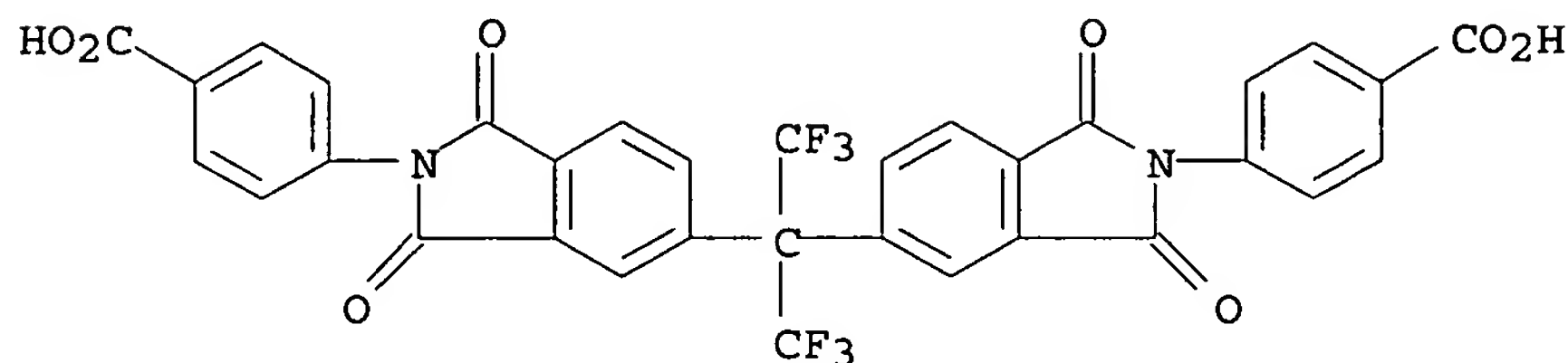
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0

CMF C33 H16 F6 N2 O8



L8 ANSWER 49 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:211305 HCAPLUS

DOCUMENT NUMBER: 138:402216

TITLE: Perfluorocyclobutyl [PFCB] copolymers for electro-optics

AUTHOR(S): Suresh, S.; Chen, Shengrong; Topping, Chris. M.; Ballato, John; Smith, Dennis W., Jr.

CORPORATE SOURCE: Department of Chemistry, Center for Optical Material Science and Engineering Technologies, Clemson University, Clemson, SC, 29634-0973, USA

SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (2003), 44(1), 1161-1162  
CODEN: ACPPAY; ISSN: 0032-3934

PUBLISHER: American Chemical Society, Division of Polymer Chemistry

DOCUMENT TYPE: Journal; (computer optical disk)

LANGUAGE: English

AB Recent developments in organic electro-optic (EO) polymers have shown promising properties for application in photonic devices such as high speed modulators and switches. Several chromophore impregnated polymers have been studied in the past decade. The better processability and low optical loss of the perfluorocyclobutyl (PFCB) polymers are advantageous for optical applications compared to other fluorinated materials and polymers. The PFCB family has emerged as promising materials for coatings, polymer waveguide, and composite matrix applications. Polyenes have been widely adopted as the conjugate units with powerful donor-acceptor terminal groups for the enhancement of hyperpolarizability in organic chromophores. Here we have synthesized some novel PFCB copolymers

with polyene dye covalently attached. The copolymers have shown excellent thermal properties, comparable mol. weight as well as good film forming characteristics.

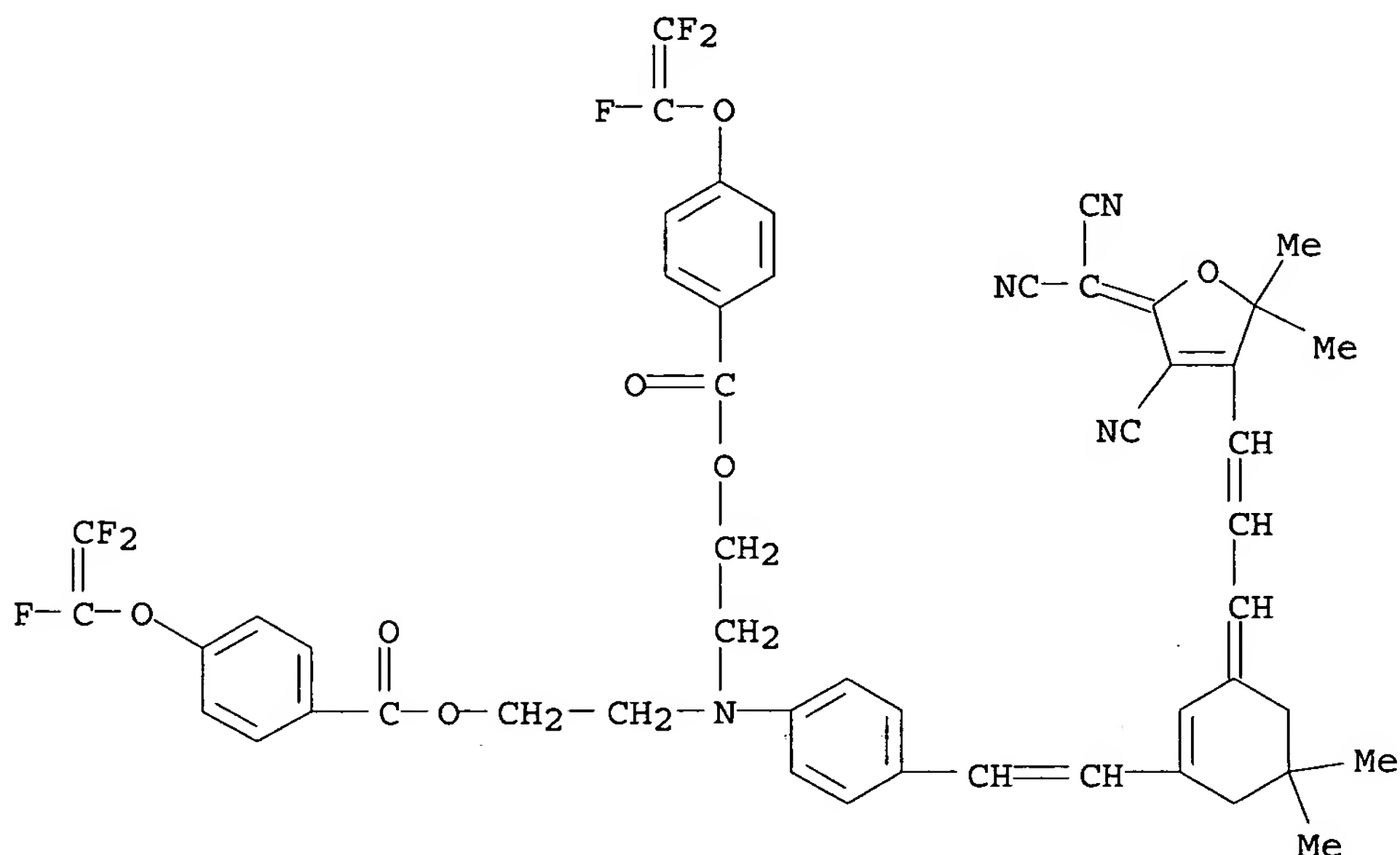
IT **530101-16-7P**

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(preparation of perfluorocyclobutyl copolymers for electro-optics)

RN 530101-16-7 HCAPLUS

CN Benzoic acid, 4-[(trifluoroethenyl)oxy]-, [[4-[2-[3-[3-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]-2-propenylidene]-5,5-dimethyl-1-cyclohexen-1-yl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)



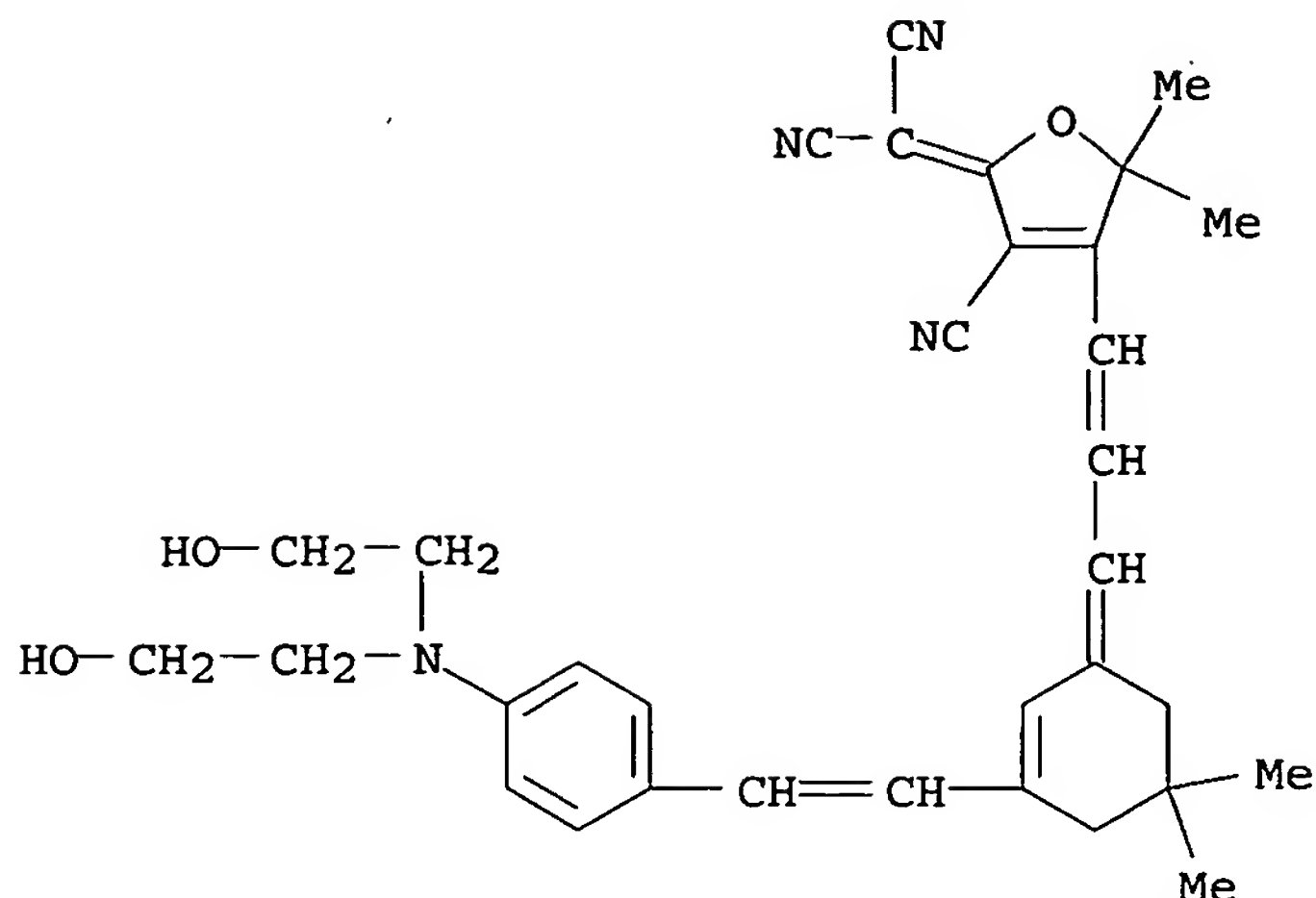
IT **224784-30-9**

RL: RCT (Reactant); RACT (Reactant or reagent)

(stating material; preparation of perfluorocyclobutyl copolymers for electro-optics)

RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 50 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:58363 HCAPLUS

DOCUMENT NUMBER: 138:123276

TITLE: Nonlinear optical polymers, compositions, and their manufacture

INVENTOR(S): Yu, Luping

PATENT ASSIGNEE(S): The University of Chicago, USA

SOURCE: PCT Int. Appl., 66 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 4

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003007071	A2	20030123	WO 2002-US22533	20020715
WO 2003007071	A3	20030515		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 2003086666	A1	20030508	US 2002-196328	20020715
US 2003085388	A1	20030508	US 2002-196734	20020715
US 2003092869	A1	20030515	US 2002-196565	20020715
US 2003100681	A1	20030529	US 2002-196353	20020715
PRIORITY APPLN. INFO.:			US 2001-305374P	P 20010713

OTHER SOURCE(S): MARPAT 138:123276

AB These compns. include chromophoric monomer units that incorporate nonlinear optic chromophores, linking monomers that may be used to link chromophoric monomers, and polymers made from chromophoric monomers or

chromophoric monomers in combination with linking monomers. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures. In addition to their covalently bonded chromophore structures, nonlinear optic polymers may be crosslinked to further increase the thermal and dipole stability of the polymers.

IT 488809-63-8P

RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)  
(nonlinear optical polyester polyimide manufacture and property)

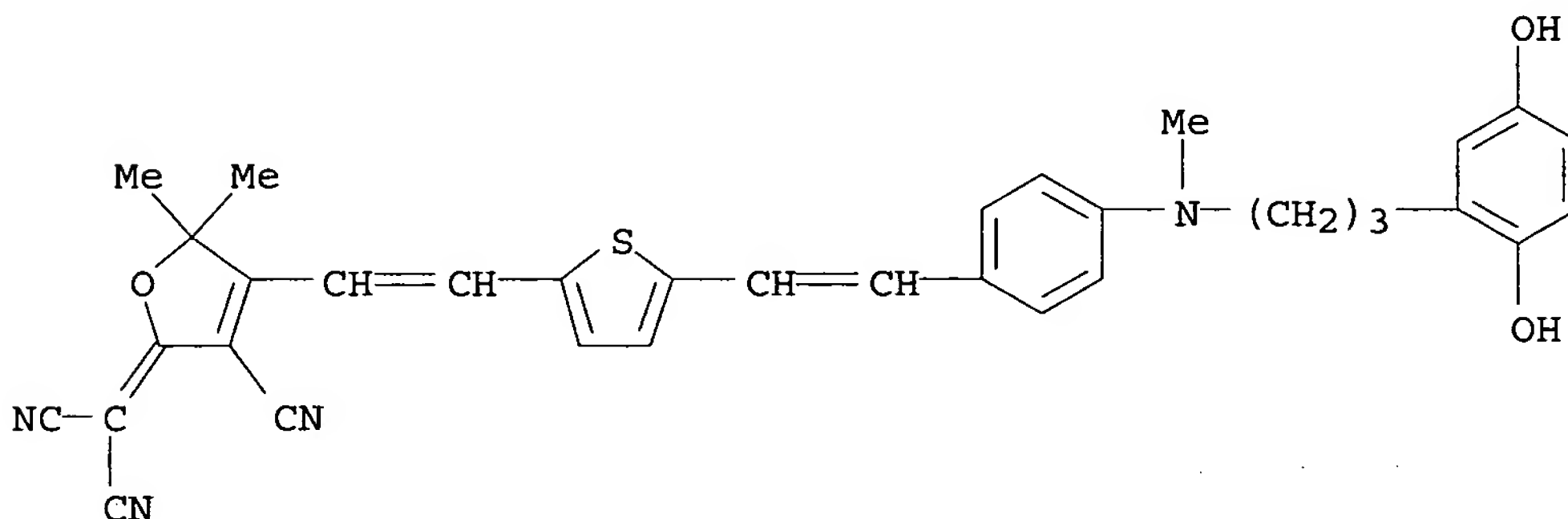
RN 488809-63-8 HCAPLUS

CN Benzoic acid, 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(1,3-dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)]bis-, polymer with [3-cyano-4-[2-[5-[2-[4-[[3-(2,5-dihydroxyphenyl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlylidene]propanedinitrile (9CI) (CA INDEX NAME)

CM 1

CRN 488809-62-7

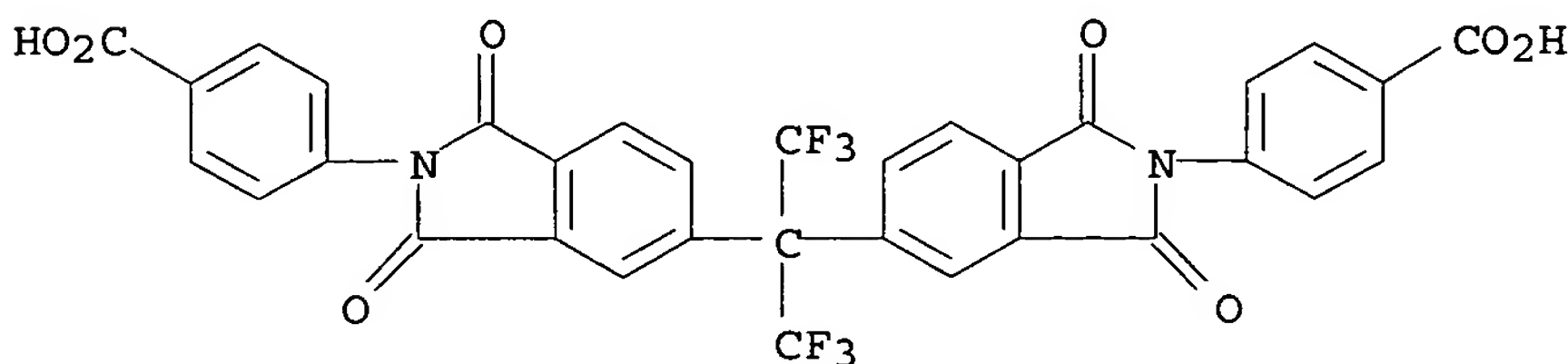
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0

CMF C33 H16 F6 N2 O8



L8 ANSWER 51 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:58362 HCAPLUS

DOCUMENT NUMBER: 138:128790

TITLE: Novel nonlinear optical polymers incorporating amines

INVENTOR(S): Yu, Luping

PATENT ASSIGNEE(S): The University of Chicago, USA

SOURCE: PCT Int. Appl., 68 pp.

CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 4  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003007070	A1	20030123	WO 2002-US22532	20020715
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 2003086666	A1	20030508	US 2002-196328	20020715
US 2003085388	A1	20030508	US 2002-196734	20020715
US 2003092869	A1	20030515	US 2002-196565	20020715
US 2003100681	A1	20030529	US 2002-196353	20020715

PRIORITY APPLN. INFO.: US 2001-305374P P 20010713

AB Comps. for forming nonlinear optical polymers are described by the general formula X-Y-Z, (X = (R1-O-CH2-CH2-)2N-; R1 = a labile group; Y is a thiphenol oligomer terminated with attached to X via a 1,4-phenylene bridge; Z= is an electron-withdrawing group; and Y and Z in combination form a nonlinear optical chromophore). Polymerization of the compds. to form polymers, the polymers formed from the compds., and electrooptical devices (e.g., phase modulators, light intensity modulators, directional couplers, optical switches, optical waveguides, and bulk devices having variable indexes of refraction) employing the polymers are also described. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures.

IT 488809-63-8P

RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (nonlinear optical polymers incorporating amines and electrooptical devices using them)

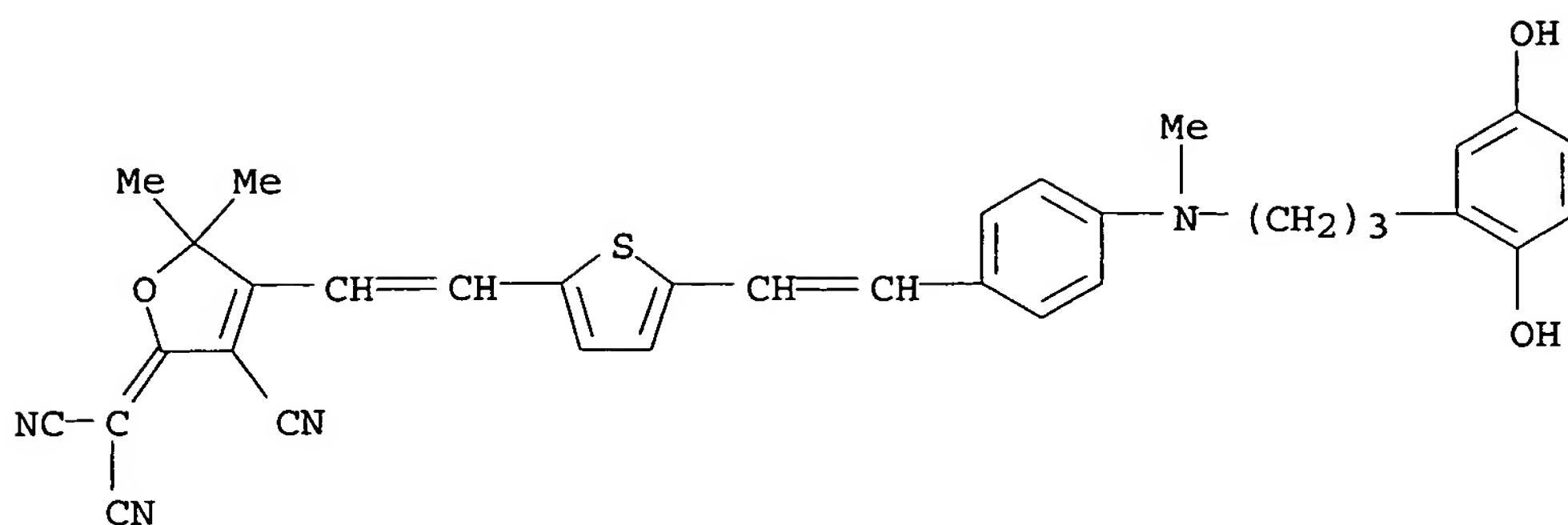
RN 488809-63-8 HCAPLUS

CN Benzoic acid, 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(1,3-dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)]bis-, polymer with [3-cyano-4-[2-[5-[2-[4-[[3-(2,5-dihydroxyphenyl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlidene]propanedinitrile (9CI) (CA INDEX NAME)

CM 1

CRN 488809-62-7

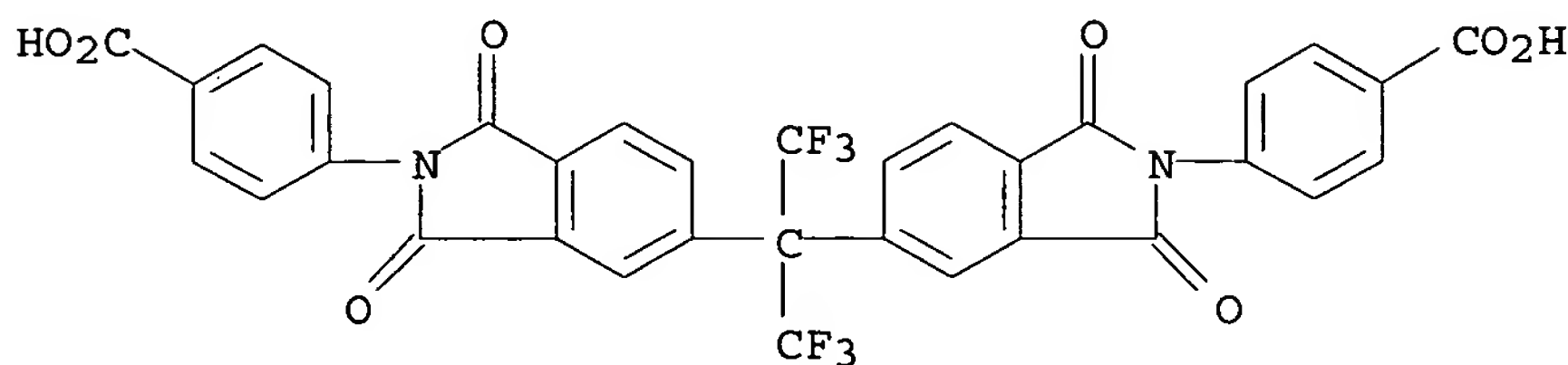
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0

CMF C33 H16 F6 N2 O8



REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

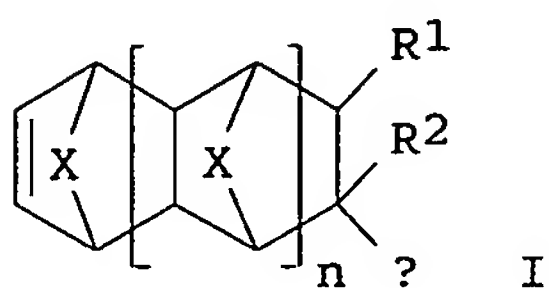
L8 ANSWER 52 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2003:58361 HCAPLUS  
 DOCUMENT NUMBER: 138:123275  
 TITLE: Nonlinear optical polymers, compositions, and their manufacture  
 INVENTOR(S): Yu, Luping  
 PATENT ASSIGNEE(S): The University of Chicago, USA  
 SOURCE: PCT Int. Appl., 81 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 4  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2003007069	A2	20030123	WO 2002-US22376	20020715
WO 2003007069	A3	20030410		
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES,				



FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF,  
CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

US 2003086666	A1	20030508	US 2002-196328	20020715
US 2003085388	A1	20030508	US 2002-196734	20020715
US 2003092869	A1	20030515	US 2002-196565	20020715
US 2003100681	A1	20030529	US 2002-196353	20020715
PRIORITY APPLN. INFO.: GI			US 2001-305374P	P 20010713



AB These compns. include chromophoric monomer units that incorporate nonlinear optic chromophores, linking monomers that may be used to link chromophoric monomers, and polymers made from chromophoric monomers or chromophoric monomers in combination with linking monomers. The polymers can exhibit high thermal stability, which is believed to arise from their covalently bonded chromophore structures. In addition to their covalently bonded chromophore structures, nonlinear optic polymers may be crosslinked to further increase the thermal and dipole stability of the polymers. Thus, monomer I having electron withdrawing group Q (3-(dicyanomethylene)-2,3-dihydrobenzo[b]thiophene) (preparation given) was polymerized with the diacid

II to give polyester polyimide having a  $\lambda_{max}$  709, glass transition temperature 170°, and decomposition temperature 245°.

IT 488809-63-8P

RL: IMF (Industrial manufacture); PRP (Properties); PREP (Preparation)  
(nonlinear optical polyester polyimide manufacture and property)

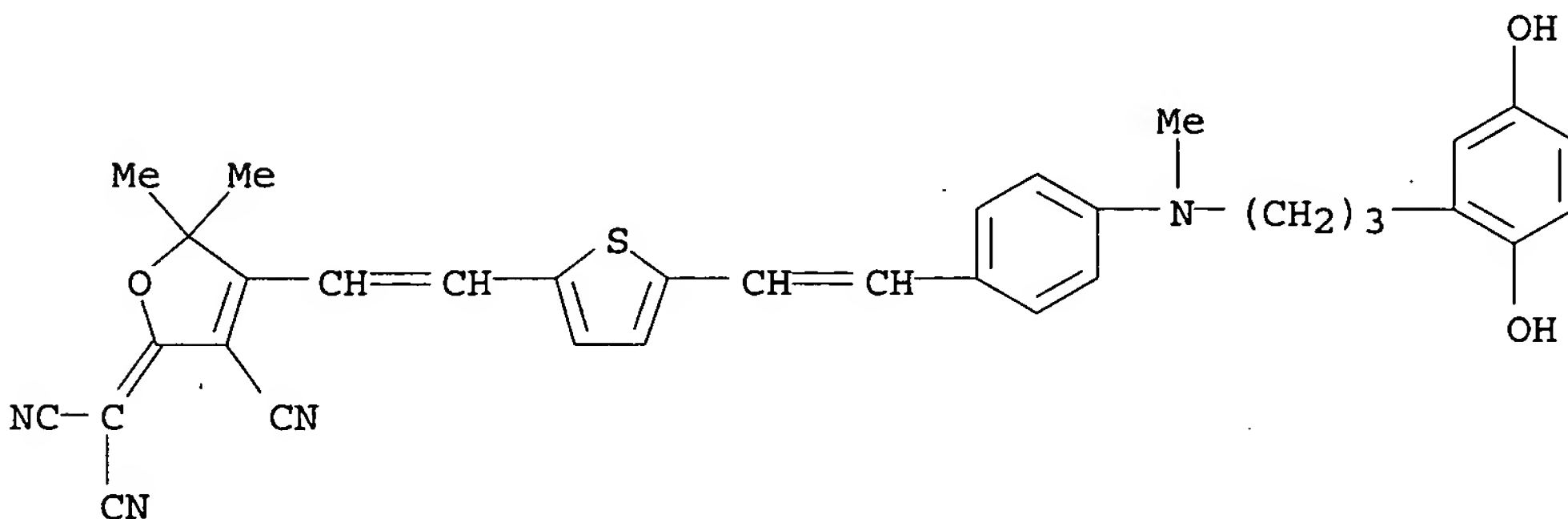
RN 488809-63-8 HCAPLUS

CN Benzoic acid, 4,4'-[[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis(1,3-dihydro-1,3-dioxo-2H-isoindole-5,2-diyl)]bis-, polymer with [3-cyano-4-[2-[5-[2-[4-[[3-(2,5-dihydroxyphenyl)propyl]methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlydene]propanedinitrile (9CI) (CA INDEX NAME)

CM 1

CRN 488809-62-7

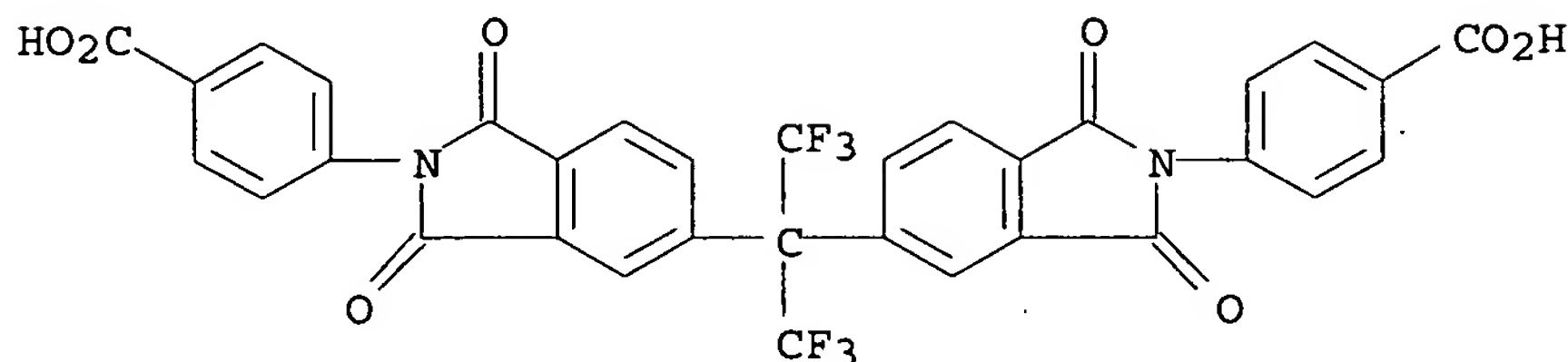
CMF C34 H30 N4 O3 S



CM 2

CRN 133532-50-0

CMF C33 H16 F6 N2 O8



L8 ANSWER 53 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:24850 HCAPLUS

DOCUMENT NUMBER: 138:214647

TITLE: Novel fluorophores for single-molecule imaging

AUTHOR(S): Willets, Katherine A.; Ostroverkhova, Oksana; He, Meng; Twieg, Robert J.; Moerner, W. E.

CORPORATE SOURCE: Department of Chemistry, Stanford University, Stanford, CA, 94305, USA

SOURCE: Journal of the American Chemical Society (2003), 125(5), 1174-1175

CODEN: JACSAT; ISSN: 0002-7863

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Nonlinear optical chromophores based on dicyanodihydrofuran acceptors paired with amine donors exhibit sufficiently large fluorescence quantum yields and stability to enable single-mol. detection in polymeric hosts. To illustrate the breadth of this class, six fluorophores are presented, spanning the emission range from 505 to 646 nm. In contrast to conventional single-mol. fluorophores, the new mols. feature sensitivity to local rigidity, large ground-state dipole moments, and large polarizability anisotropies, properties that can be used to design new reporter expts. at the single-mol. level.

IT 296280-34-7 402490-54-4 481642-78-8

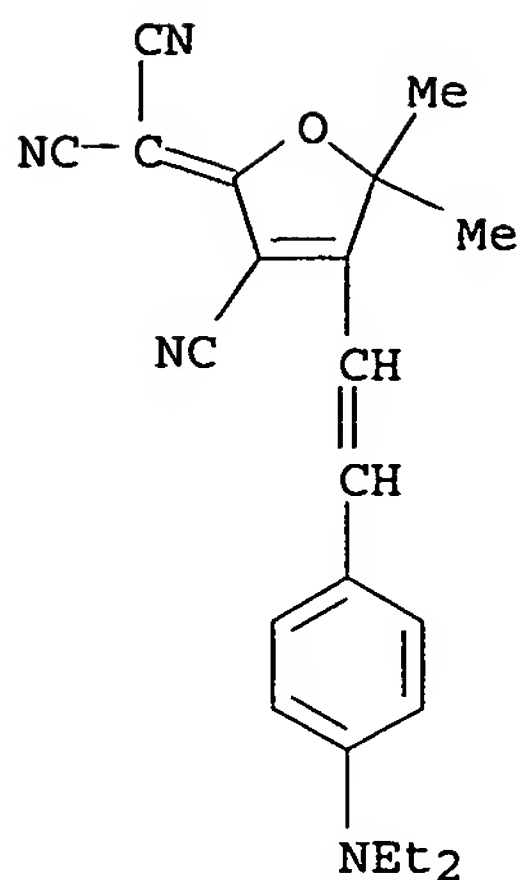
500198-24-3 500198-25-4

RL: ARG (Analytical reagent use); PRP (Properties); ANST (Analytical study); USES (Uses)

(fluorophores based on dicyanodihydrofuran acceptors paired with amine donors for single-mol. imaging)

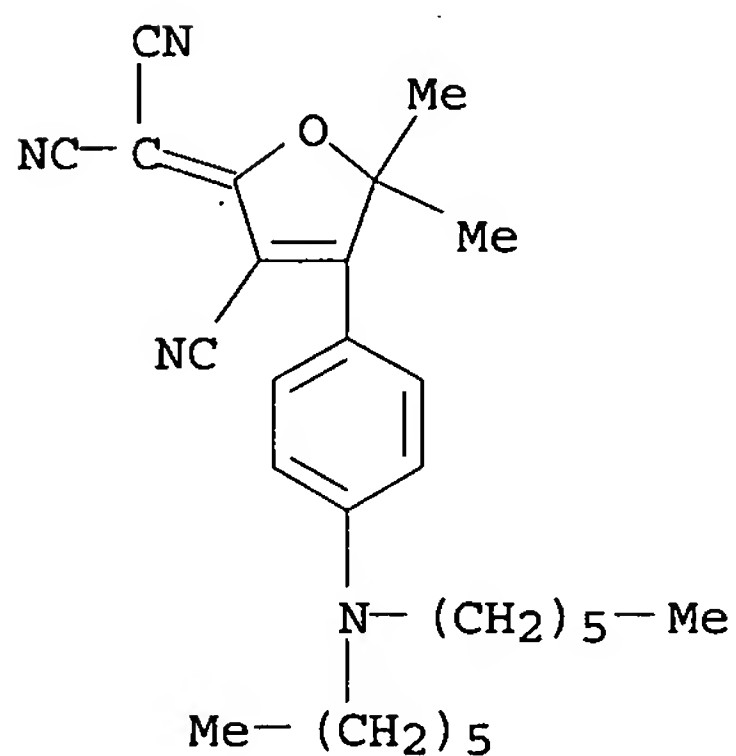
RN 296280-34-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



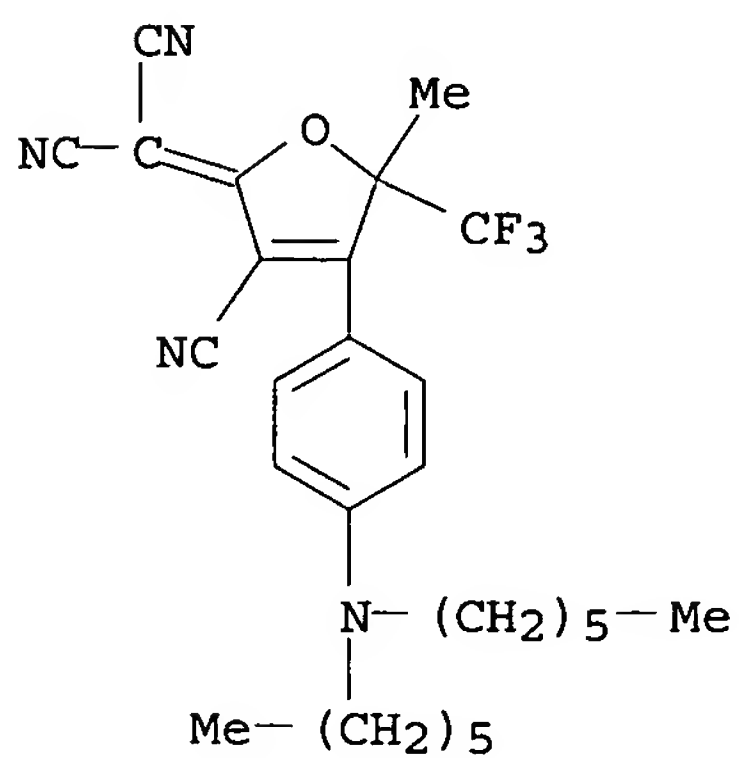
RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(diethylamino)phenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



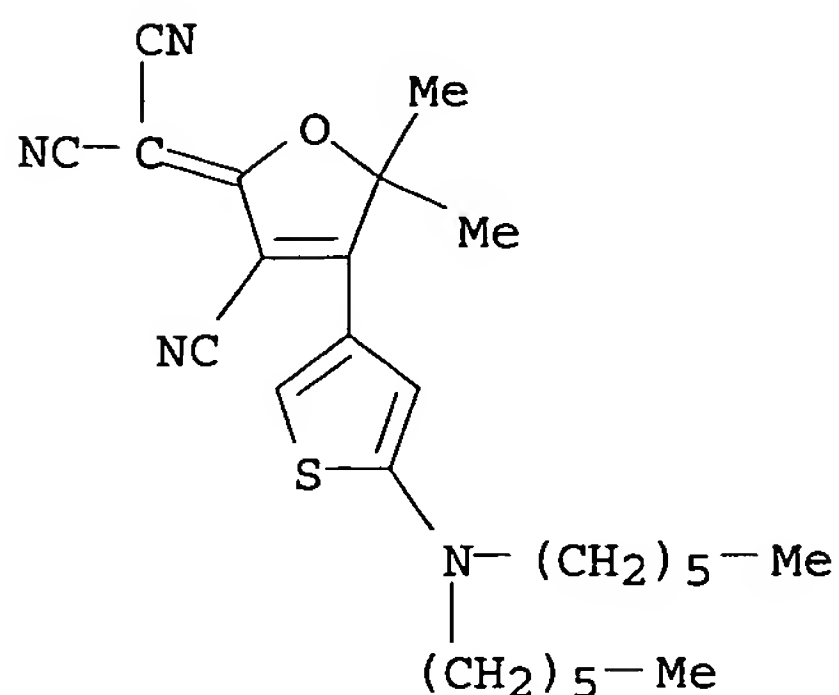
RN 481642-78-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



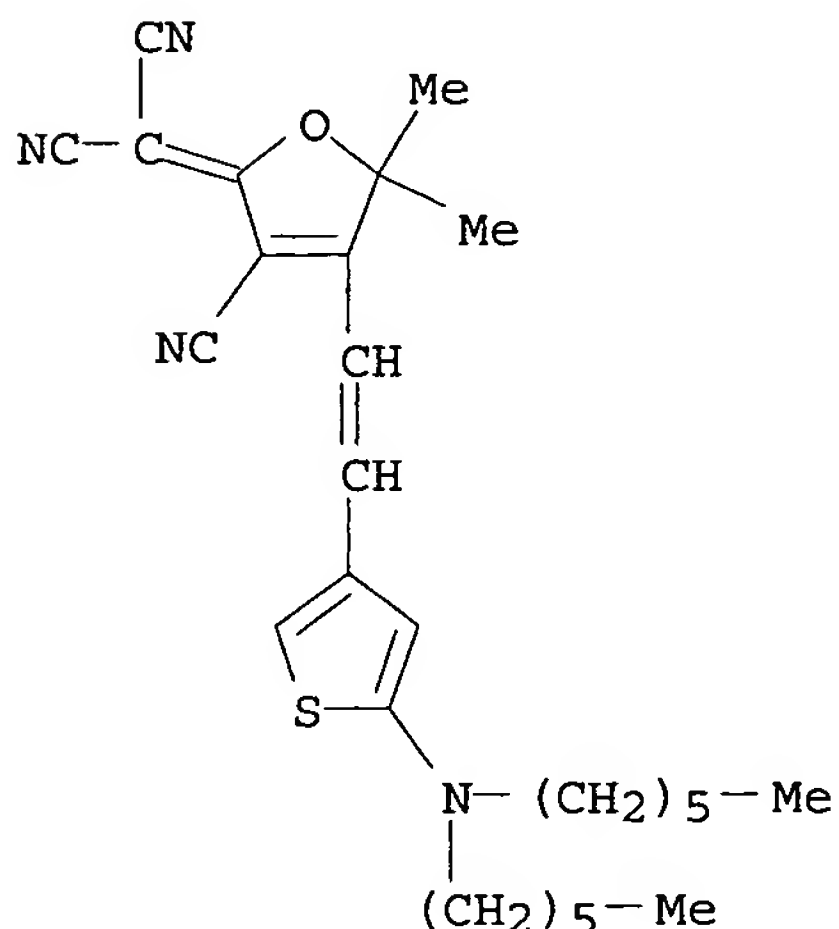
RN 500198-24-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[5-(dihexylamino)-3-thienyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 500198-25-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-(dihexylamino)-3-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 28 THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 54 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2003:3036 HCAPLUS

DOCUMENT NUMBER: 138:255621

TITLE: Design, synthesis, and properties of highly efficient side-chain dendronized nonlinear optical polymers for electro-optics

AUTHOR(S): Luo, Jingdong; Liu, Sen; Haller, Marnie; Liu, Lu; Ma, Hong; Jen, Alex K.-Y.

CORPORATE SOURCE: Department of Materials Science and Engineering, University of Washington, Seattle, WA, 98195-2120, USA

SOURCE: Advanced Materials (Weinheim, Germany) (2002), 14(23), 1763-1768

CODEN: ADVMEW; ISSN: 0935-9648

PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA

DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB A simple and generally applicable method is developed for the post-functionalization of side-chain dendronized NLO polymers. This approach provides the combined advantages of achieving better poling efficiency through the site-isolation effect and shortening the time required for EO dendrimer synthesis. High poling efficiency has been achieved to afford an exceptionally large EO coefficient (97 pmV<sup>-1</sup> at 1.3 μm).

IT 502558-70-5P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation) (design, synthesis, and properties of highly efficient side-chain dendronized nonlinear optical polymers for electro-optics)

RN 502558-70-5 HCAPLUS

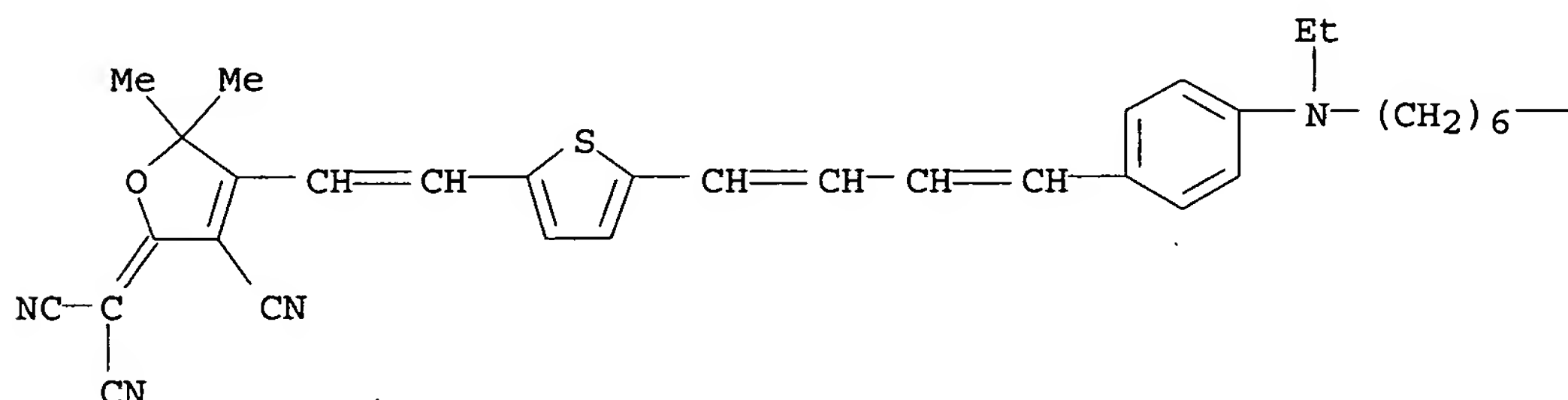
CN Phenol, 4-ethenyl-, homopolymer, benzoate 6-[[4-[4-[5-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]-1,3-butadienyl]phenyl]ethylamino]hexyl 1,2-benzenedicarboxylate (9CI) (CA INDEX NAME)

CM 1

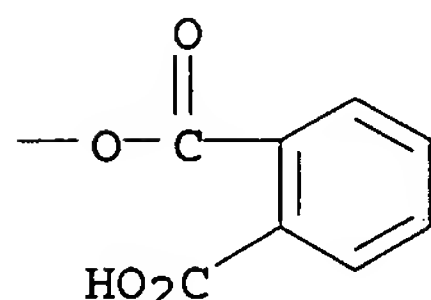
CRN 502449-25-4

CMF C42 H40 N4 O5 S

PAGE 1-A



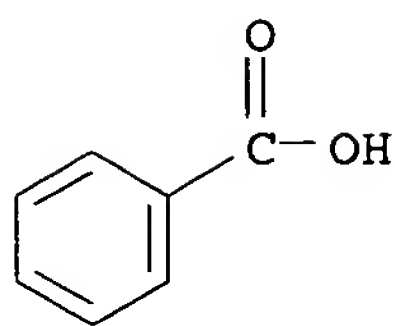
PAGE 1-B



CM 2

CRN 65-85-0

CMF C7 H6 O2

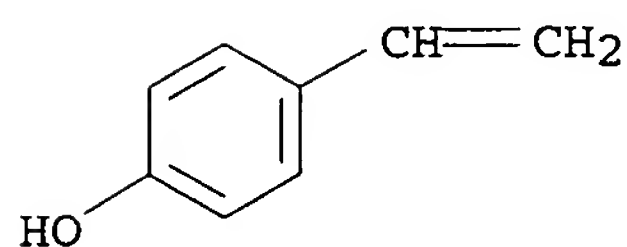


CM 3

CRN 24979-70-2  
 CMF (C8 H8 O)x  
 CCI PMS

CM 4

CRN 2628-17-3  
 CMF C8 H8 O



IT 502449-23-2

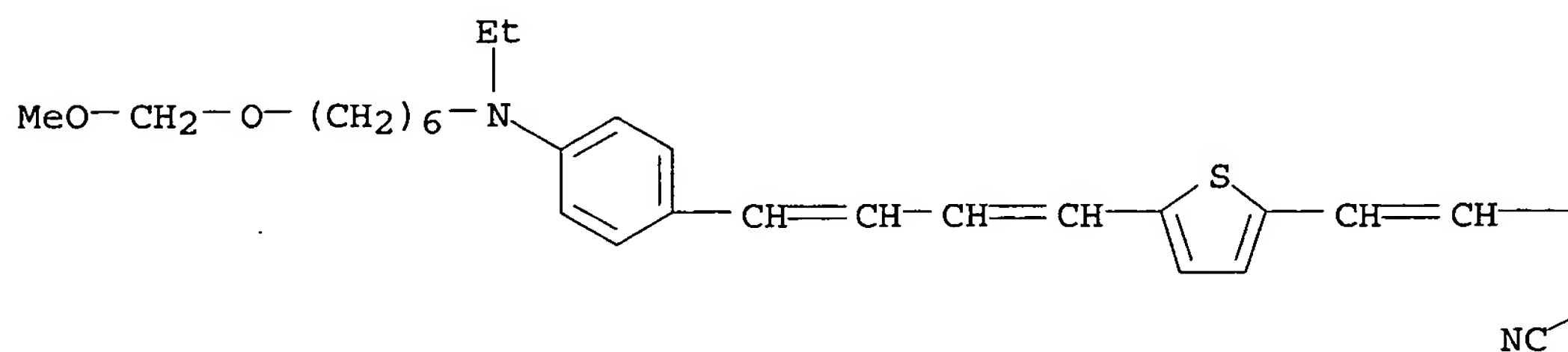
RL: RCT (Reactant); RACT (Reactant or reagent)

(pendent chromophore synthesis; design, synthesis, and properties of  
 highly efficient side-chain dendronized nonlinear optical polymers for  
 electro-optics)

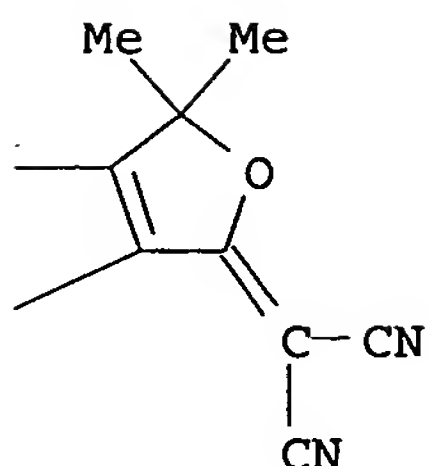
RN 502449-23-2 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[4-[4-[ethyl[6-(methoxymethoxy)hexyl]amino]phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



IT 502449-21-0P

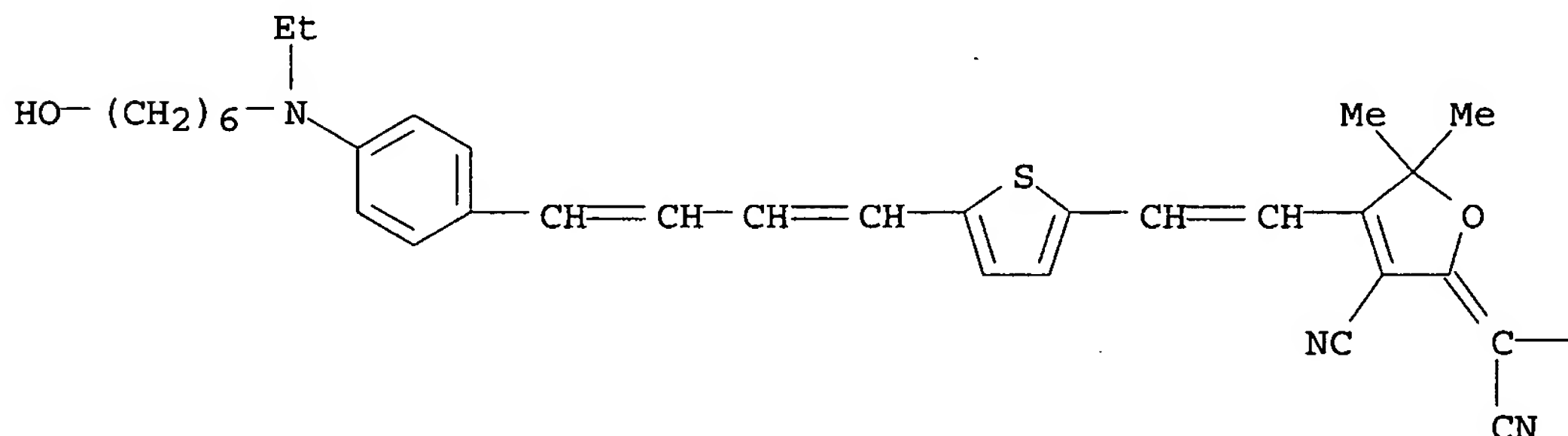
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(pendent chromophore synthesis; design, synthesis, and properties of highly efficient side-chain dendronized nonlinear optical polymers for electro-optics)

RN 502449-21-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[4-[4-[ethyl(6-hydroxyhexyl)amino]phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B

— CN

IT 502449-25-4P

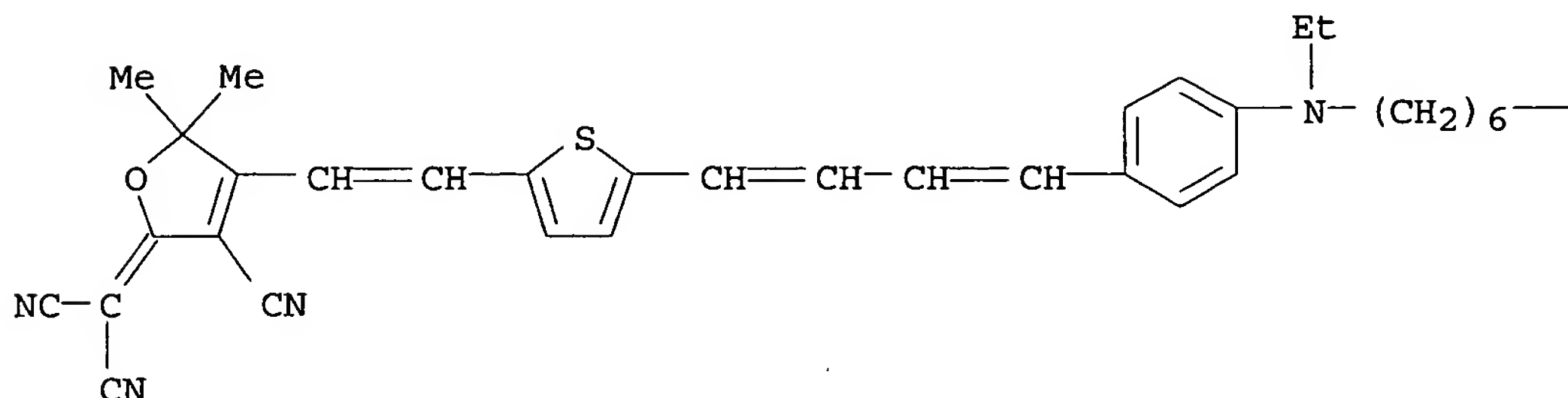
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(pendent chromophore; design, synthesis, and properties of highly efficient side-chain dendronized nonlinear optical polymers for electro-optics)

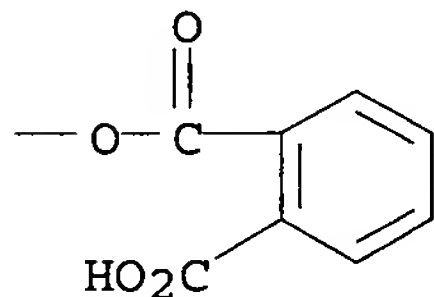
RN 502449-25-4 HCAPLUS

CN 1,2-Benzenedicarboxylic acid, mono[6-[[4-[4-[5-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-thienyl]-1,3-butadienyl]phenyl]ethylamino]hexyl] ester (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



REFERENCE COUNT: 39 THERE ARE 39 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 55 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:833542 HCAPLUS

DOCUMENT NUMBER: 137:332023

TITLE: Highly hyperpolarizable chromophore for core guest host systems useful for electro-optic devices

INVENTOR(S): Taylor, Rebecca Ellen; Ermer, Susan Patricia; Bedworth, Peter V.; Lovejoy, Steven M.; Leung, Doris S.; Warren, Hope B.

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 3 pp.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 1

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002161165	A1	20021031	US 2002-119316	20020410
WO 2002100974	A2	20021219	WO 2002-US11230	20020410
WO 2002100974	A3	20030403		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW



RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRIORITY APPLN. INFO.:

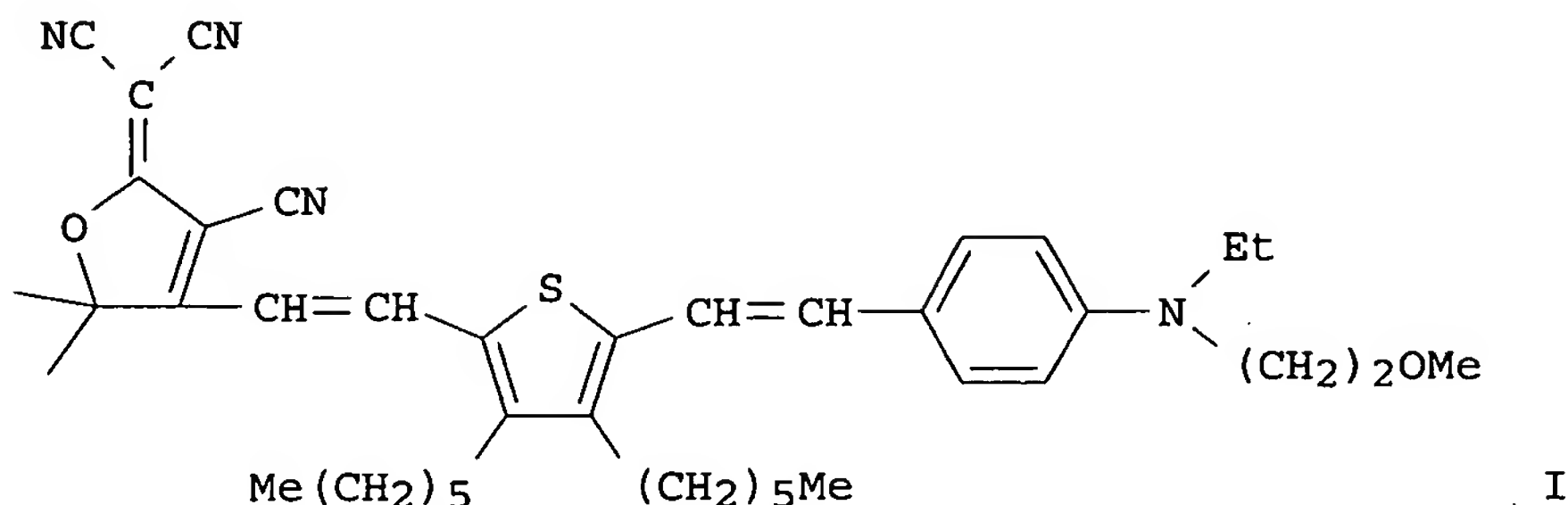
US 2001-282478P

P 20010410

US 2002-119316

A 20020410

GI



AB A chromophore in a polymer is given having the structure I in a polycarbonate matrix. The composition is useful for electro-optic material that does not suffer (by heat) from the limitations of prior materials used in the art. It is a further object to provide a new class of highly hyperpolarizability organic chromophores. It is yet a further object of this invention to show a process for synthesizing the novel highly hyperpolarizable organic chromophores. Another object is to provide devices such as electrooptical modulators employing the new class of novel highly hyperpolarizable organic chromophores.

IT 473796-78-0P

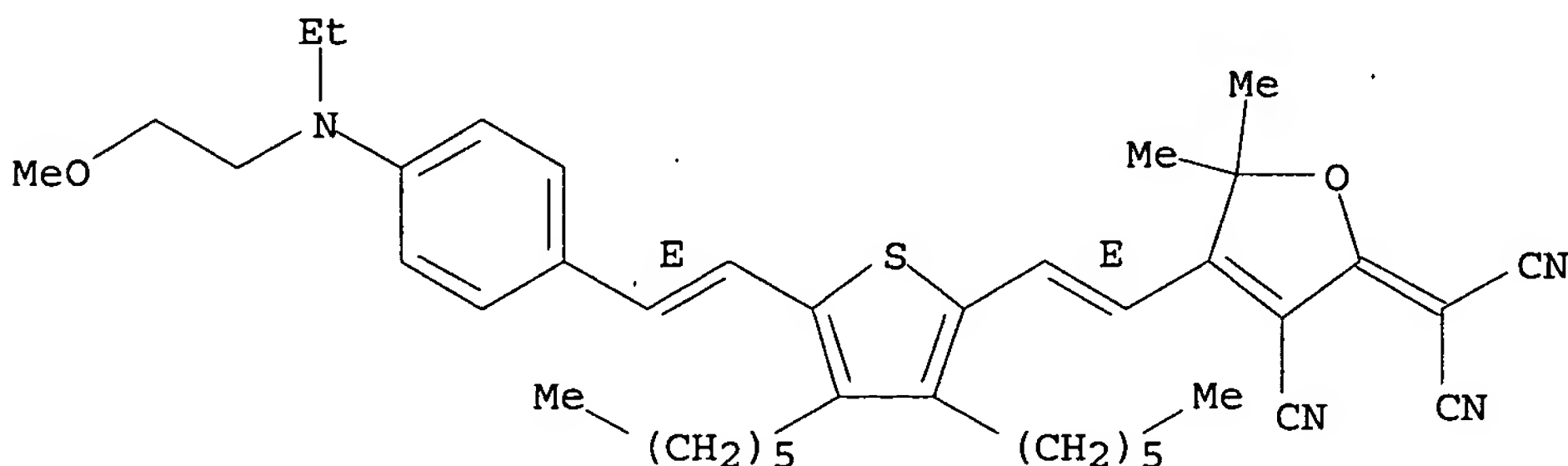
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(chromophore; highly hyperpolarizable chromophore for core guest host systems useful for electro-optic devices)

RN 473796-78-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E)-2-[5-[(2E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-3,4-dihexyl-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



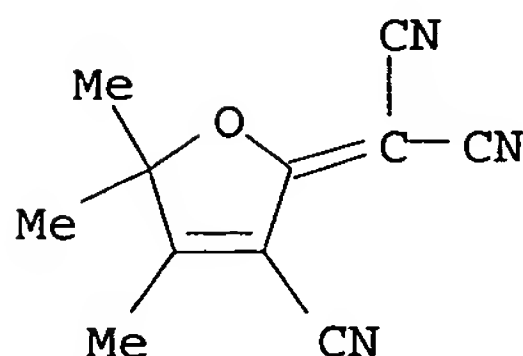
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(highly hyperpolarizable chromophore for core guest host systems useful for electro-optic devices)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA INDEX NAME)



L8 ANSWER 56 OF 118. HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:787053 HCAPLUS

DOCUMENT NUMBER: 138:14286

TITLE: Synthesis of Chromophores with Extremely High Electro-optic Activities. 2. Isophorone- and Combined Isophorone-Thiophene-Based Chromophores

AUTHOR(S): He, Mingqian; Leslie, Thomas M.; Sinicropi, John A.; Garner, Sean M.; Reed, Leon D.

CORPORATE SOURCE: Corning Incorporated, Corning, NY, 14831, USA

SOURCE: Chemistry of Materials (2002), 14(11), 4669-4675

CODEN: CMATEX; ISSN: 0897-4756

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Four new isophorone and combined isophorone and thiophene bridged chromophores have been synthesized. All of these new high  $\mu\beta$  chromophores possess our newly synthesized tricyanovinylidihydrofuran acceptors. Because of our unique acceptor design, all of our chromophores show high solubility in all organic solvents due to minimized chromophore-chromophore electrostatic interactions. These chromophores have also been studied with respect to their solvatochromism and thermal behavior by TGA in air. Preliminary EO characterization of one of these chromophores in polycarbonate has demonstrated an extremely high  $r_{33}$  of 70 pm/V at 1550 nm. We believe that this is the largest  $r_{33}$  reported at this wavelength.

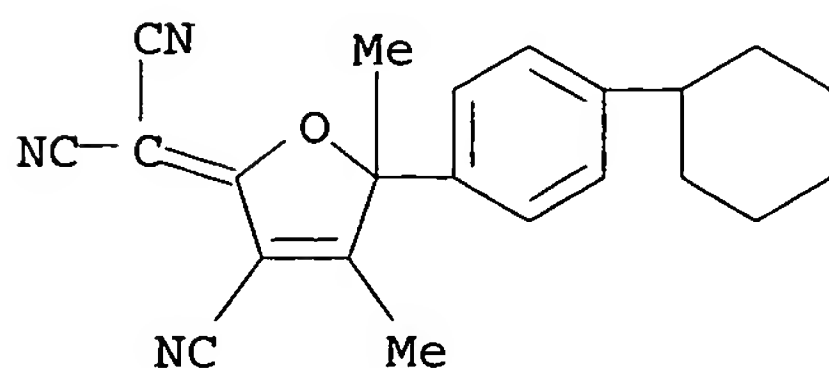
IT 383124-80-9 436097-13-1

RL: RCT (Reactant); RACT (Reactant or reagent)

(acceptor; in reaction with aldehyde derivs. to synthesis isophorone- and combined isophorone-thiophene-based chromophores)

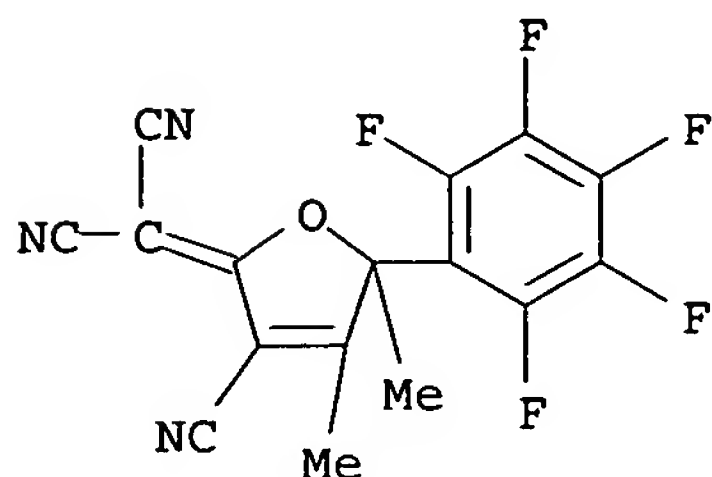
RN 383124-80-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 436097-13-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(pentafluorophenyl)-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



IT 477741-14-3P

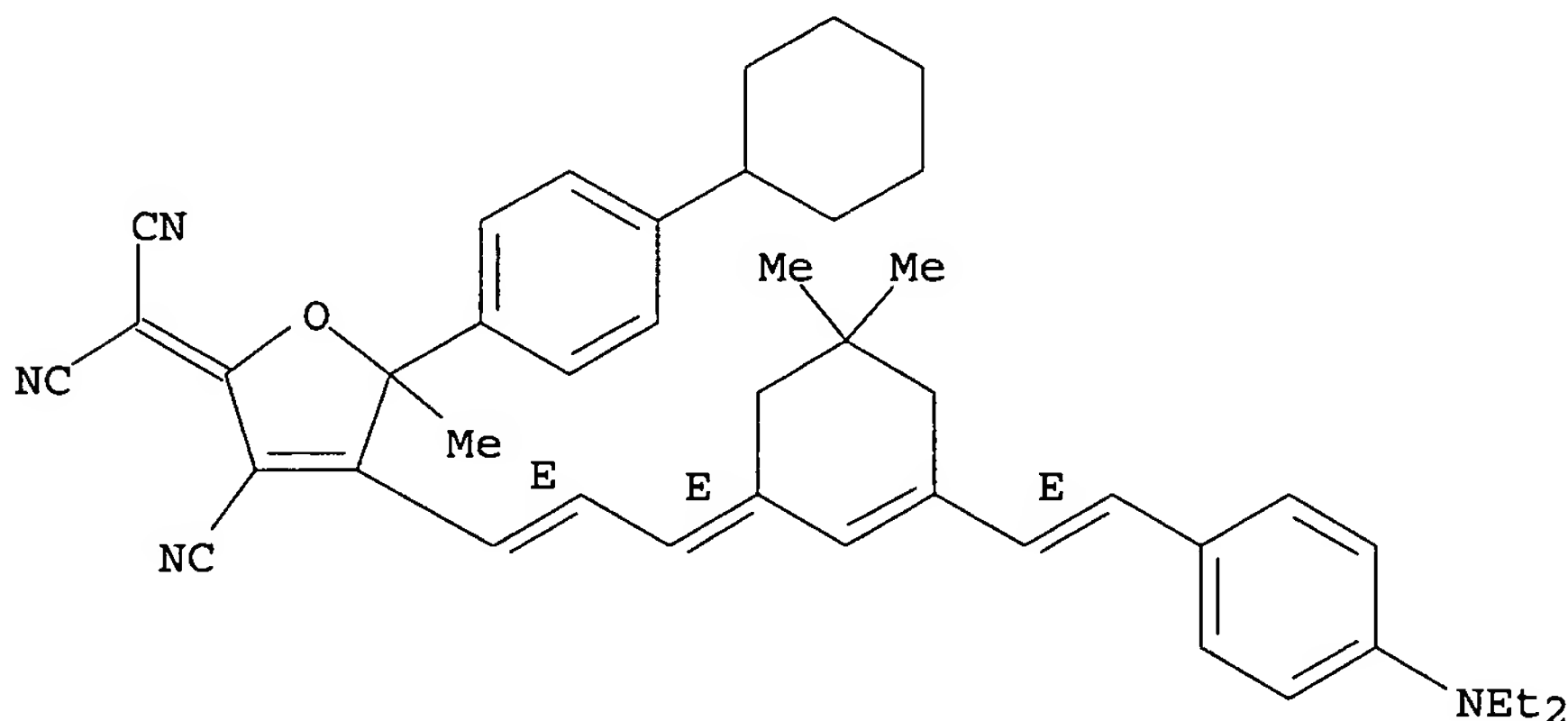
RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(synthesis of isophorone- and combined isophorone-thiophene-based chromophores with extremely high electro-optic activities)

RN 477741-14-3 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 477741-15-4P 477741-16-5P 477741-17-6P

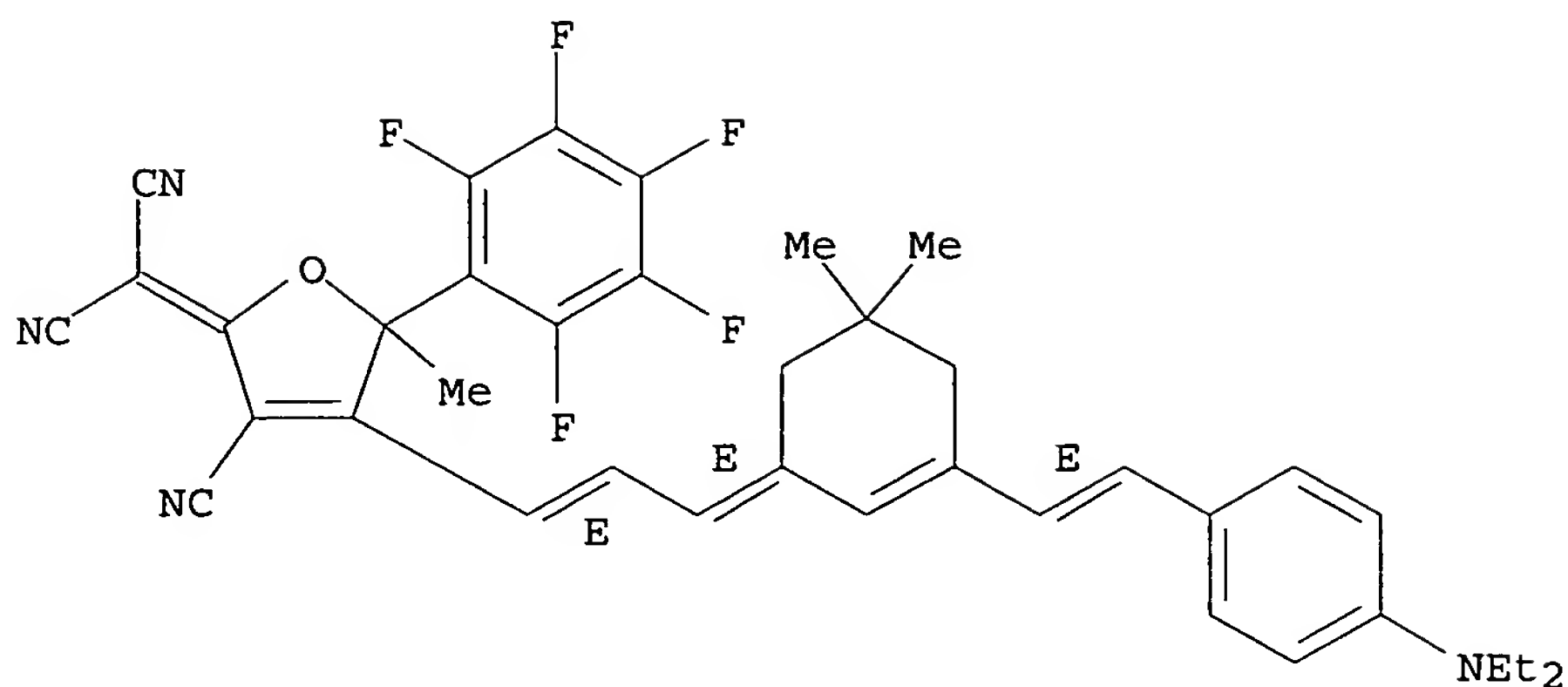
RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)

(synthesis of isophorone- and combined isophorone-thiophene-based chromophores with extremely high electro-optic activities)

RN 477741-15-4 HCAPLUS

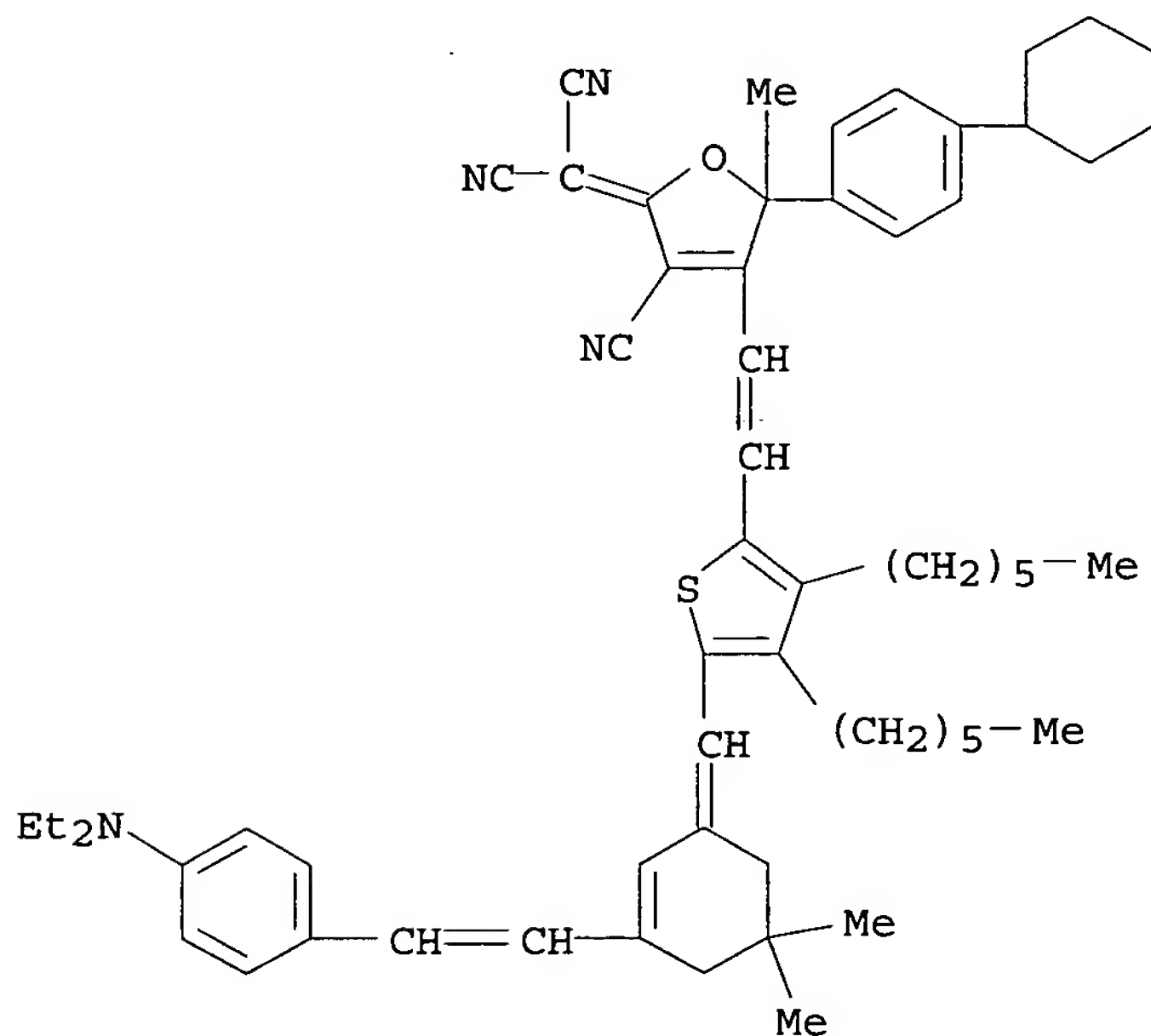
CN Propanedinitrile, [3-cyano-4-[(1E,3E)-3-[3-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5-methyl-5-(pentafluorophenyl)-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 477741-16-5 HCAPLUS

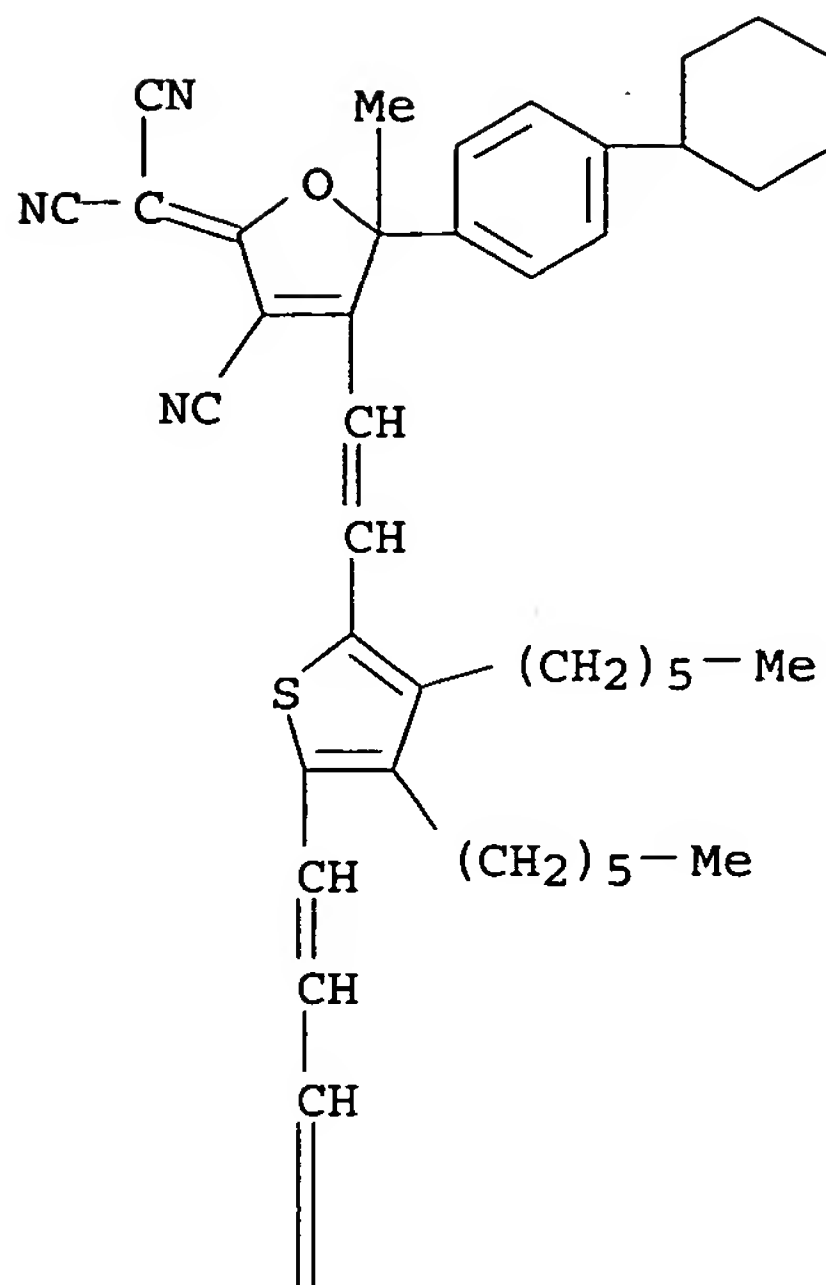
CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[2-[5-[[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]methyl]-3,4-dihexyl-2-thienyl]ethenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



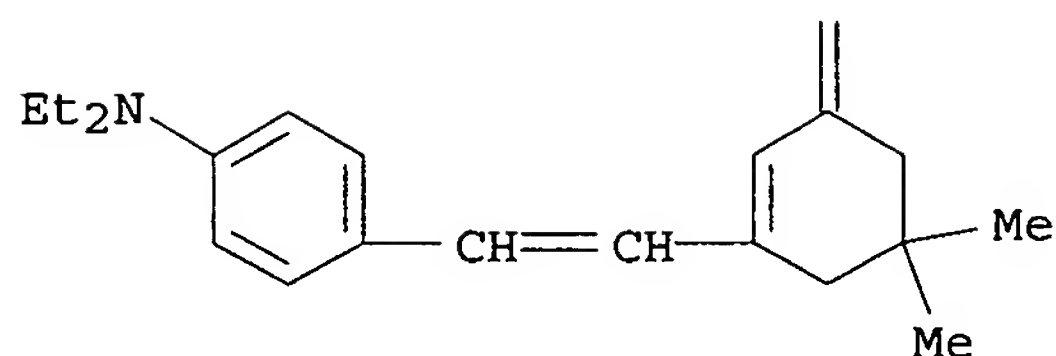
RN 477741-17-6 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[2-[5-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3,4-dihexyl-2-thienyl]ethenyl]-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



REFERENCE COUNT: 19 THERE ARE 19 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 57 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:787052 HCAPLUS

DOCUMENT NUMBER: 138:24608

TITLE: Synthesis of Chromophores with Extremely High Electro-optic Activity. 1. Thiophene-Bridge-Based Chromophores

AUTHOR(S): He, Mingqian; Leslie, Thomas M.; Sinicropi, John A.

CORPORATE SOURCE: Corning Incorporated, Corning, NY, 14831, USA

SOURCE: Chemistry of Materials (2002), 14(11), 4662-4668

CODEN: CMATEX; ISSN: 0897-4756

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

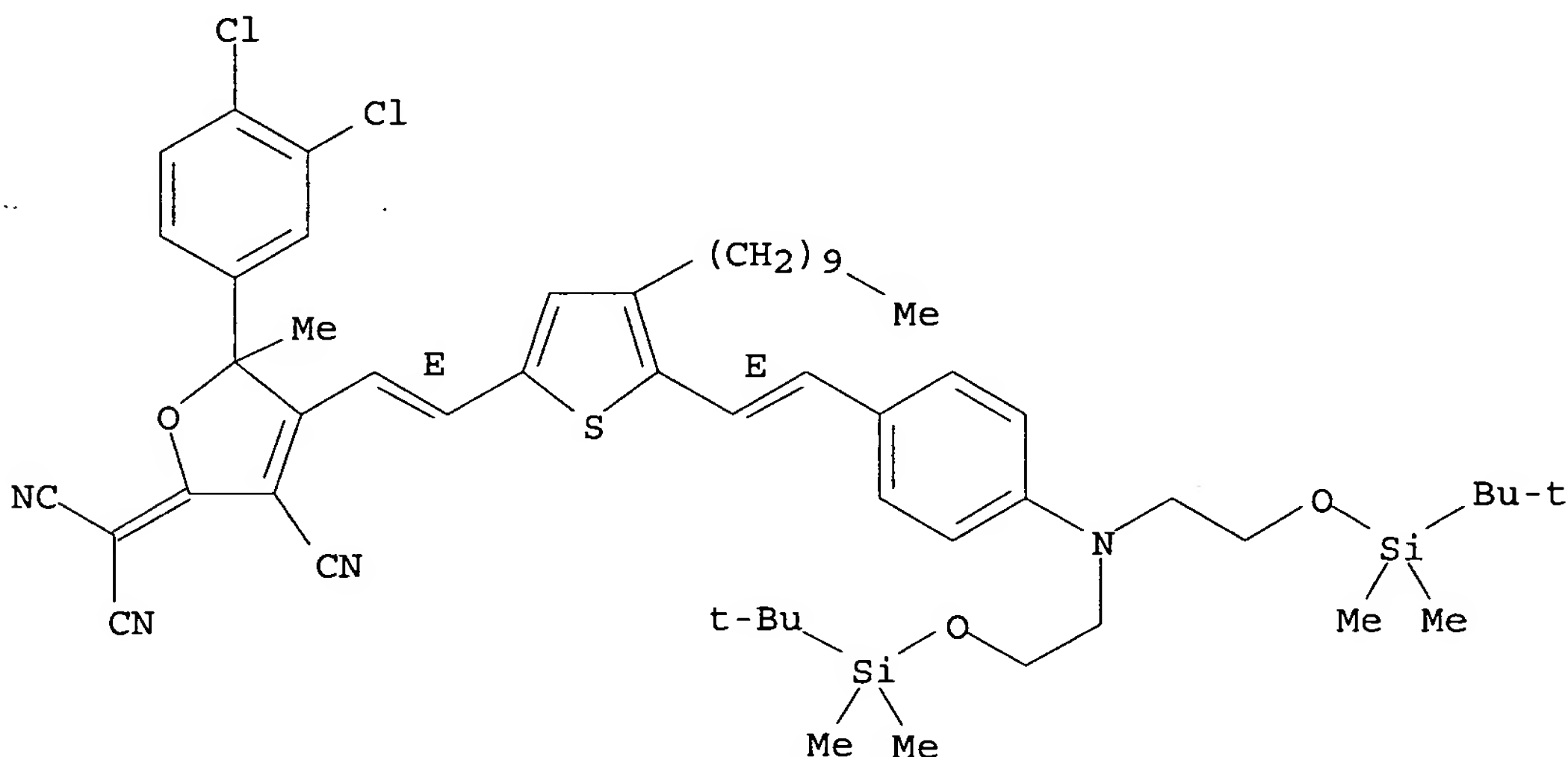
OTHER SOURCE(S): CASREACT 138:24608

AB We have successfully synthesized several new substituted thiophene-based electro-optic chromophores. All of these chromophores have structures similar to FTC but they incorporated our newly designed

IT 477892-06-1P 477892-32-3P 477892-34-5P  
477892-35-6P 477892-36-7P 477892-37-8P  
477892-39-0P 477892-40-3P

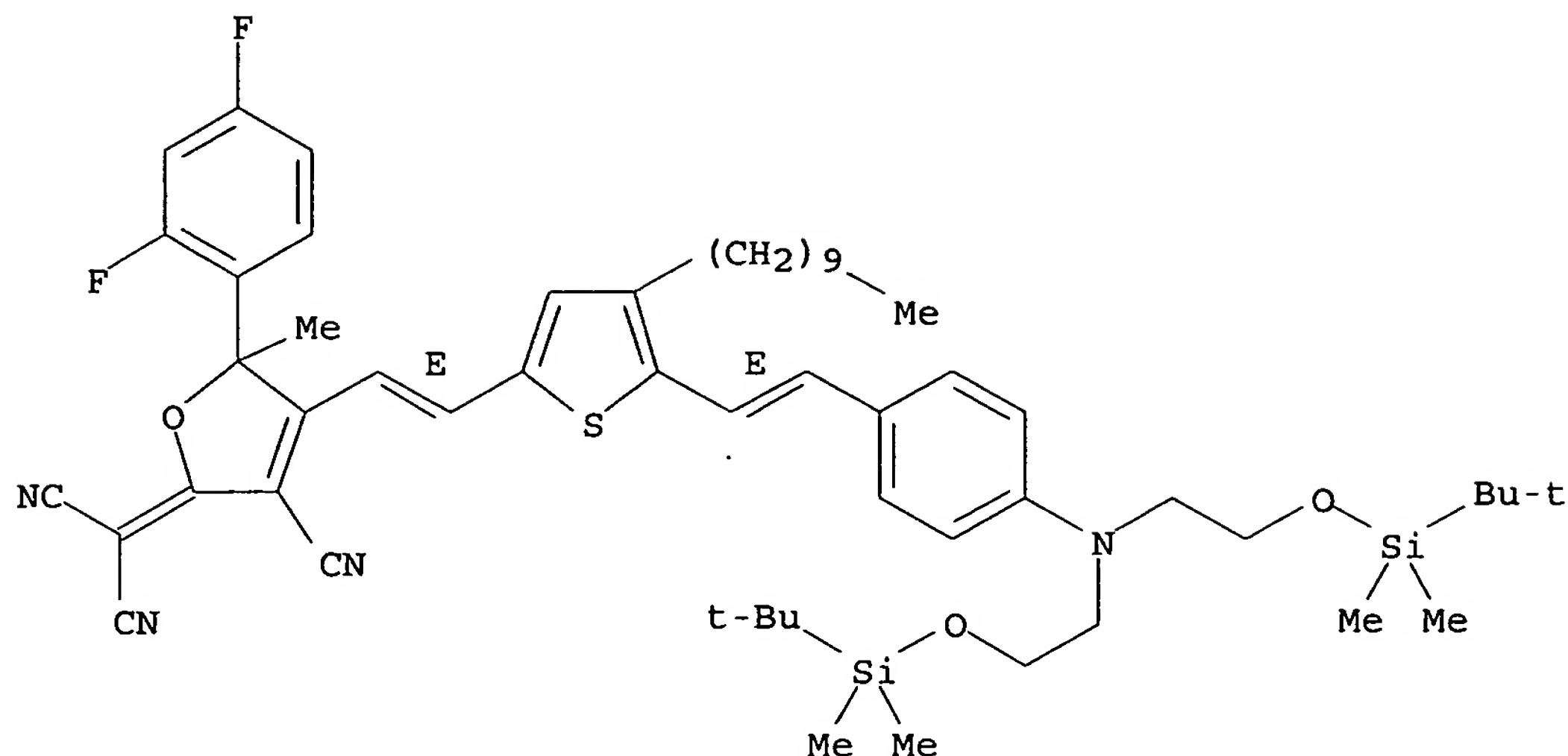
RN 477892-06-1 HCAPLUS

Double bond geometry as shown.



CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-4-decyl-2-thienyl]ethenyl]-3-cyano-5-(2,4-difluorophenyl)-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

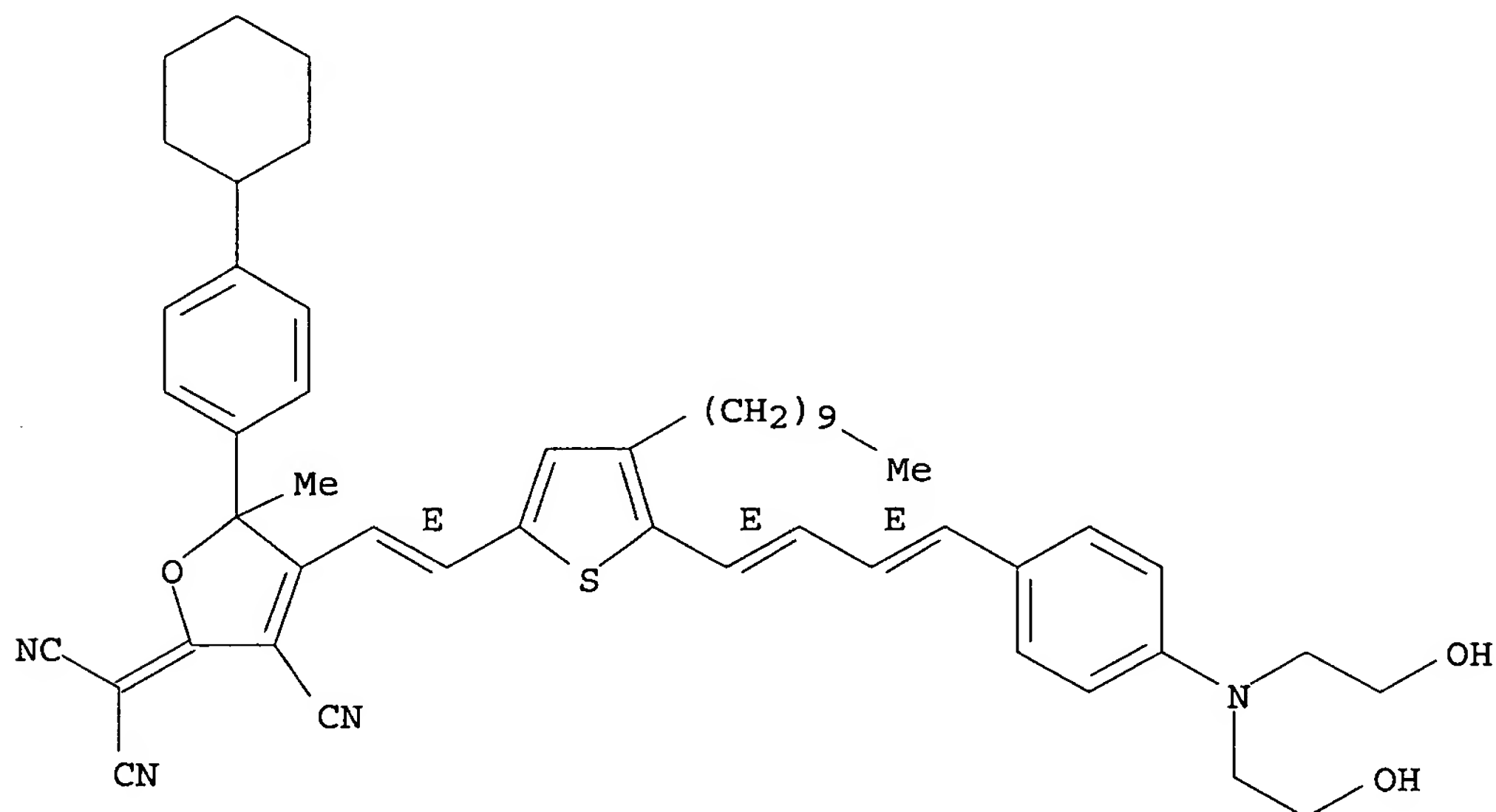
Double bond geometry as shown.



RN 477892-34-5 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E,3E)-4-[4-[bis(2-hydroxyethyl)amino]phenyl]-1,3-butadienyl]-4-decyl-2-thienyl]ethenyl]-3-cyano-5-(4-cyclohexylphenyl)-5-methyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

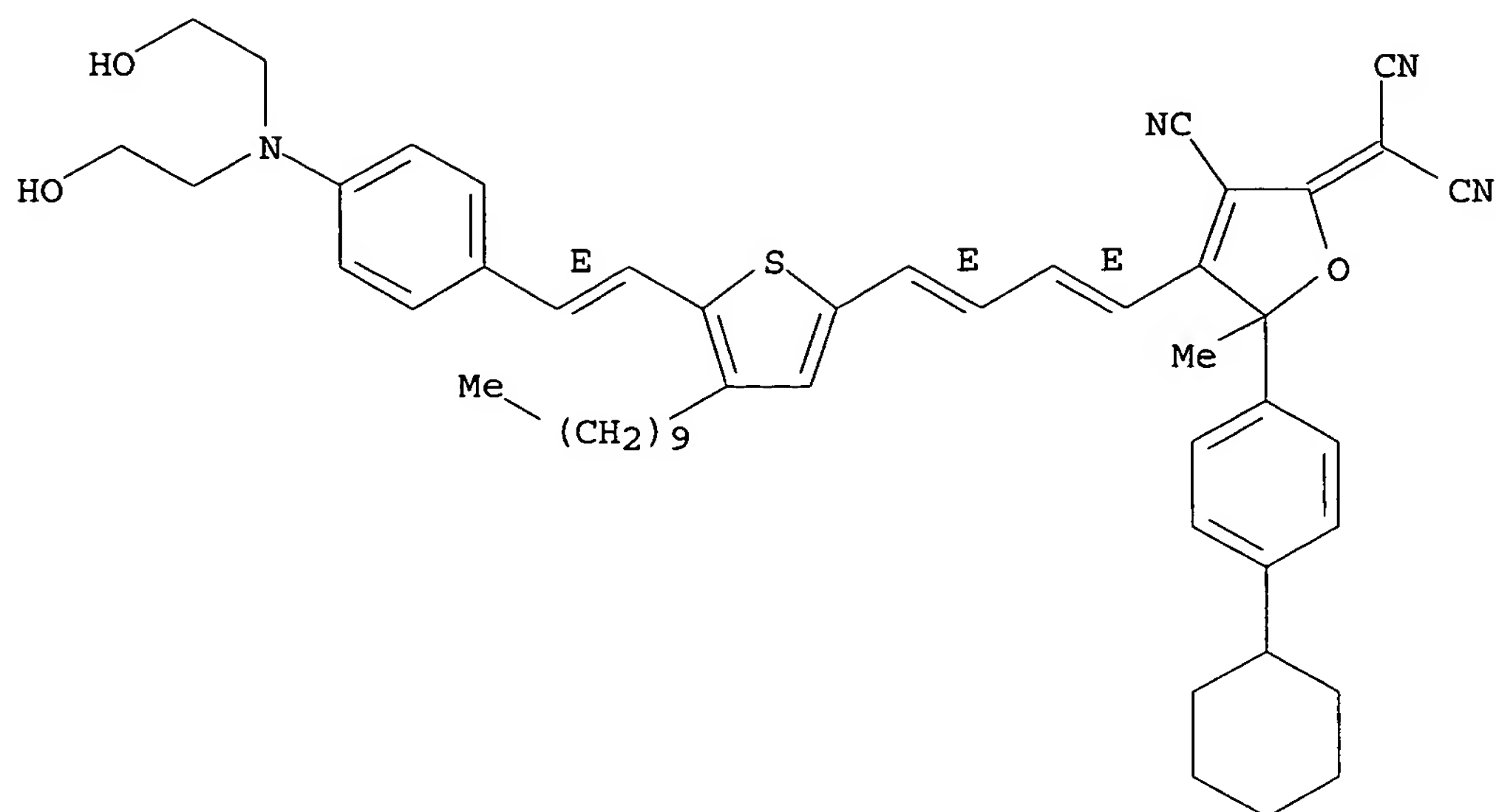
Double bond geometry as shown.



RN 477892-35-6 HCAPLUS

CN Propanedinitrile, [4-[(1E,3E)-4-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-4-decyl-2-thienyl]-1,3-butadienyl]-3-cyano-5-(4-cyclohexylphenyl)-5-methyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.

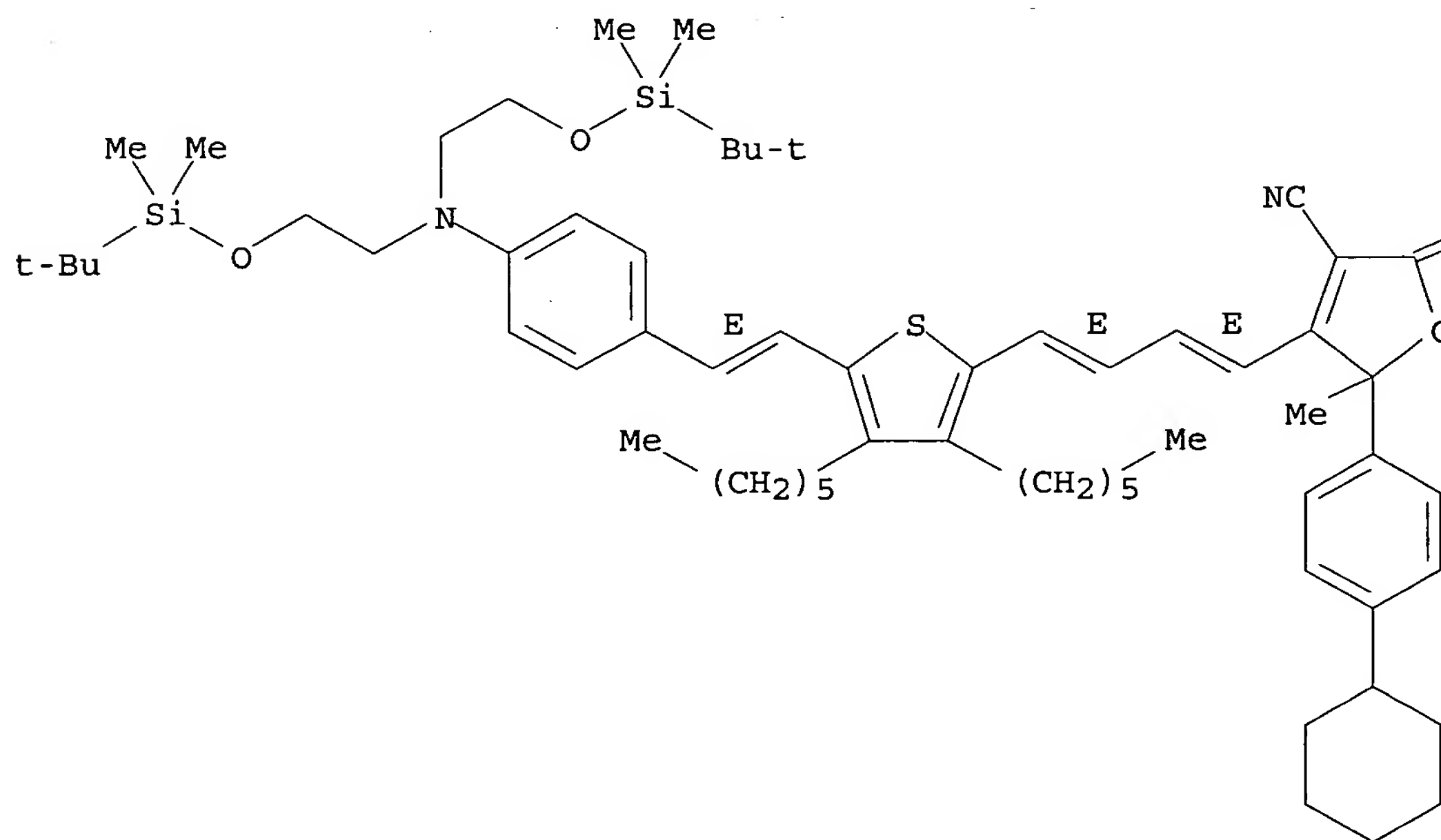


RN 477892-36-7 HCAPLUS

CN Propanedinitrile, [4-[(1E,3E)-4-[5-[(1E)-2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-3,4-dihexyl-2-thienyl]-1,3-butadienyl]-3-cyano-5-(4-cyclohexylphenyl)-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

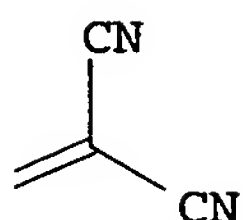
Double bond geometry as shown.

PAGE 1-A





PAGE 1-B

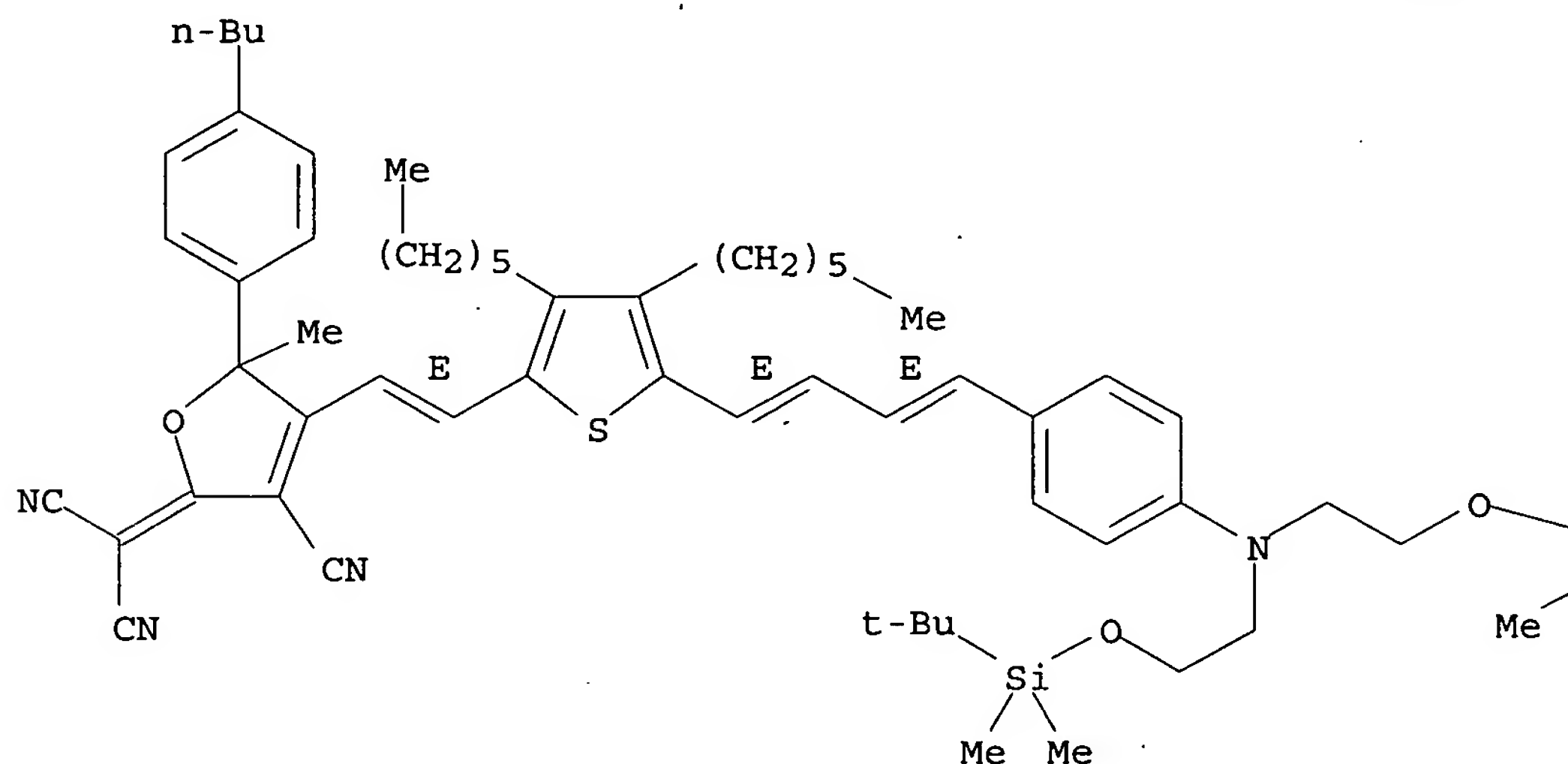


RN 477892-37-8 HCAPLUS

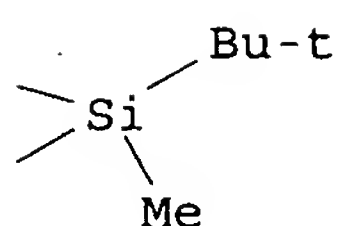
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E,3E)-4-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]-1,3-butadienyl]-3,4-dihexyl-2-thienyl]ethenyl]-5-(4-butylphenyl)-3-cyano-5-methyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



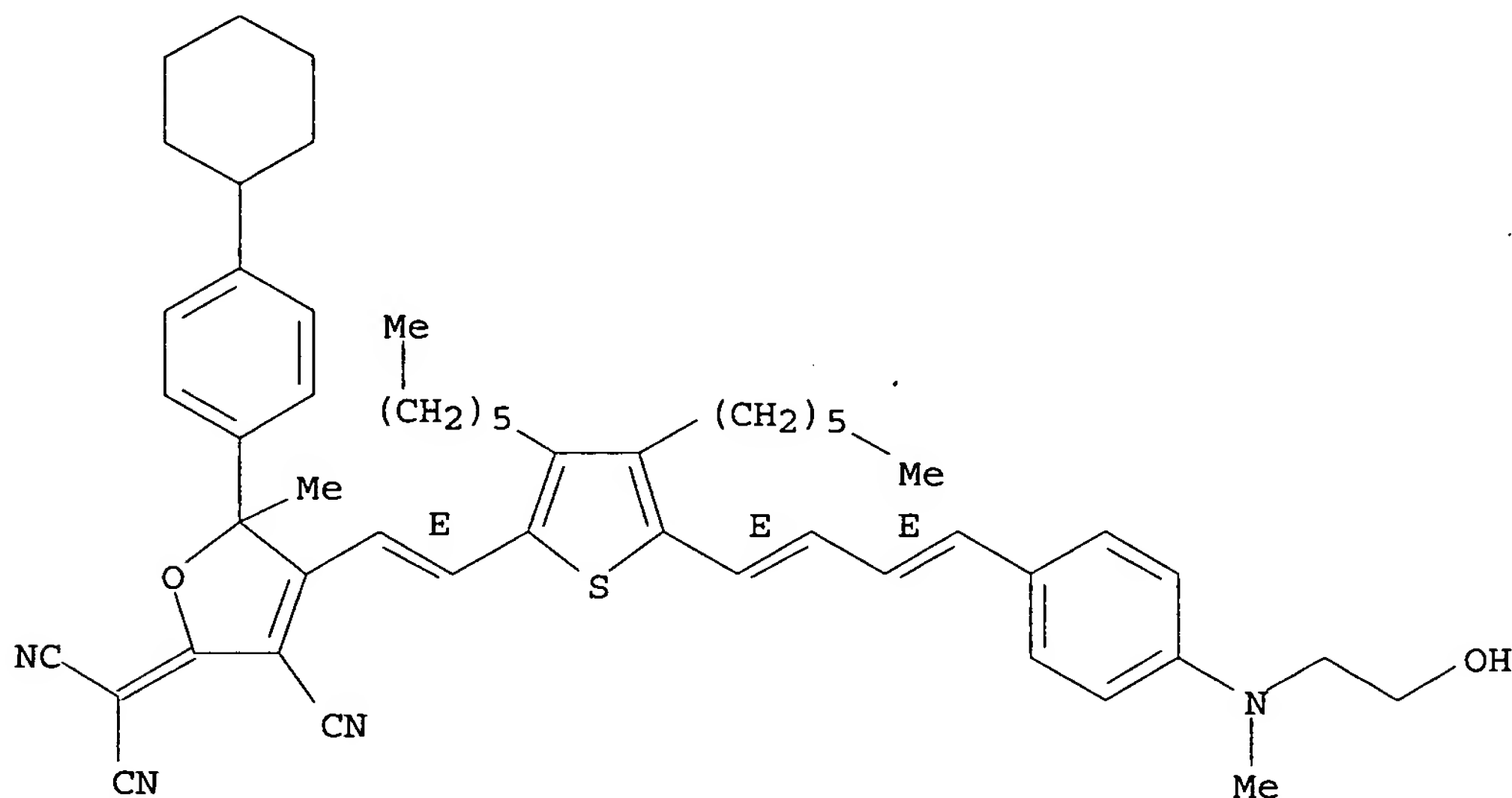
PAGE 1-B



RN 477892-39-0 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4-[(1E)-2-[3,4-dihexyl-5-[(1E,3E)-4-[4-[(2-hydroxyethyl)methylamino]phenyl]-1,3-butadienyl]-2-thienyl]ethenyl]-5-methyl-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)

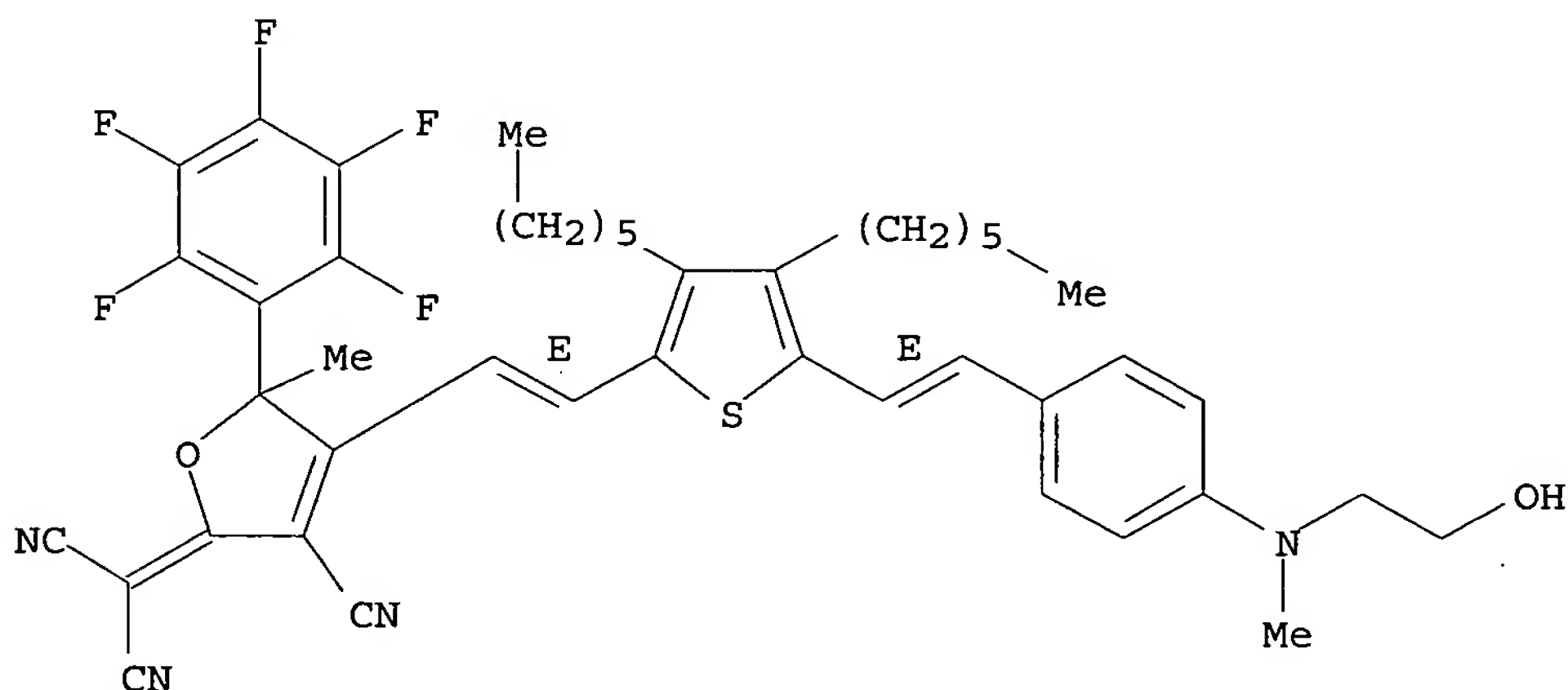
Double bond geometry as shown.



RN 477892-40-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dihexyl-5-[(1E)-2-[4-[(2-hydroxyethyl)methylamino]phenyl]ethenyl]-2-thienyl]ethenyl]-5-methyl-5-(pentafluorophenyl)-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



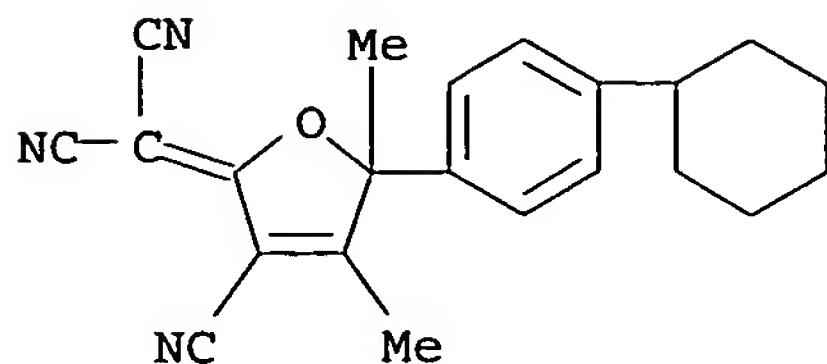
IT 383124-80-9 383124-82-1 383124-89-8  
436097-13-1

RL: RCT (Reactant); RACT (Reactant or reagent)  
(starting material; synthesis of thiophene-bridge-based chromophores  
with extremely high electro-optic activity)

RN 383124-80-9 HCAPLUS

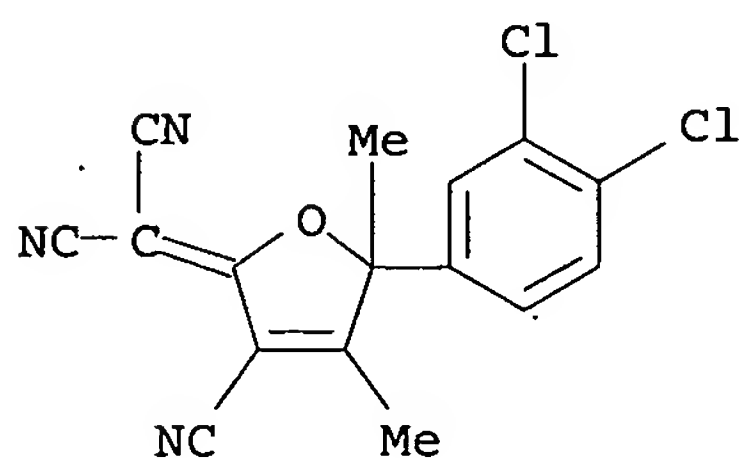
CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4,5-dimethyl-2(5H)-

furanylidene]- (9CI) (CA INDEX NAME)



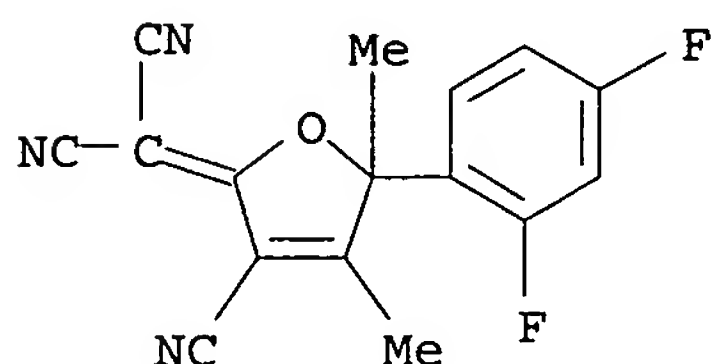
RN 383124-82-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



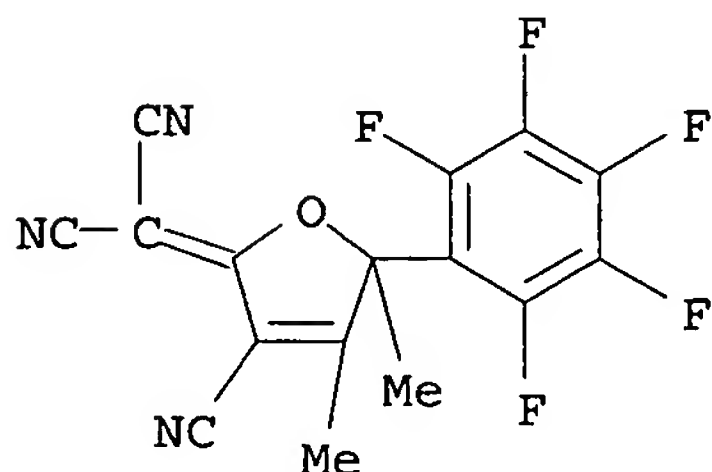
RN 383124-89-8 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(2,4-difluorophenyl)-4,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 436097-13-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(pentafluorophenyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT:

13

THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 58 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:770499 HCAPLUS

DOCUMENT NUMBER: 138:80243

TITLE: Recent advances in understanding and development of photorefractive polymers and glasses

AUTHOR(S): Ostroverkhova, Oksana; Wright, Daniel; Gubler, Ulrich; Moerner, W. E.; He, Meng; Sastre-Santos, Angela; Twieg, Robert J.

CORPORATE SOURCE: Department of Chemistry, Stanford University, Stanford, CA, 94305, USA

SOURCE: Advanced Functional Materials (2002), 12(9), 621-629  
CODEN: AFMDC6; ISSN: 1616-301X

PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The photoconductive, orientational, and photorefractive properties of monolithic glasses based on new nonlinear optical chromophores containing a 2-dicyanomethylene-3-cyano-2,5-dihydrofuran (DCDHF) acceptor group are presented. Large net gain coeffs. are observed in both red and IR wavelength regions. The phys. and optical properties of glasses based on various DCDHF-containing derivs. are compared and analyzed, and the factors limiting steady-state and dynamical photorefractive performance are discussed.

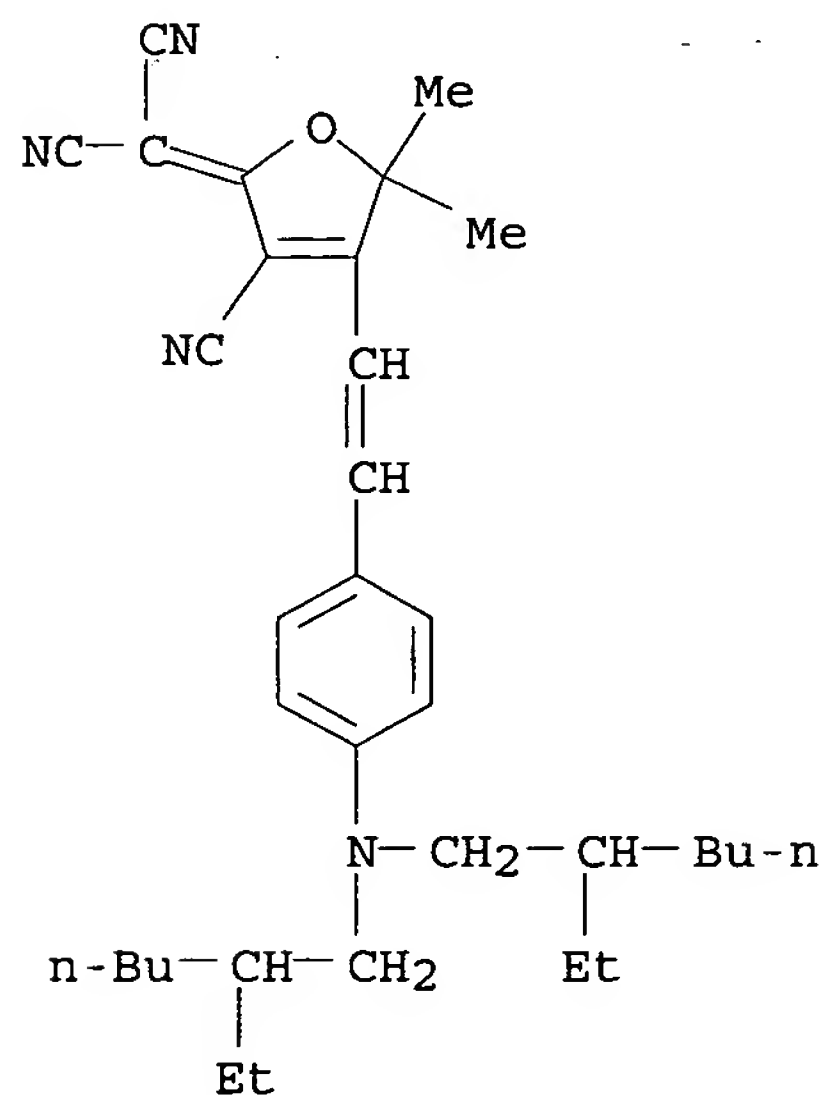
IT 481642-79-9

RL: PRP (Properties)

(DCDHF-2EH-V; photorefractive and phys. properties of)

RN 481642-79-9 HCAPLUS

CN Propanedinitrile, [4-[2-[4-[bis(2-ethylhexyl)amino]phenyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



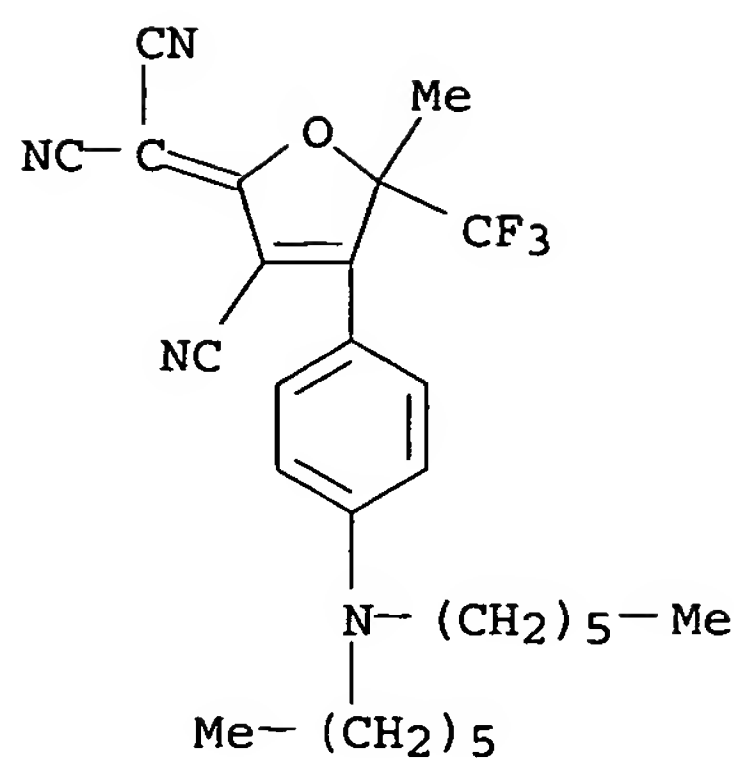
IT 481642-78-8

RL: PRP (Properties)

(DCDHF-6-CF3; photorefractive and phys. properties of)

RN 481642-78-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(diethylamino)phenyl]-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



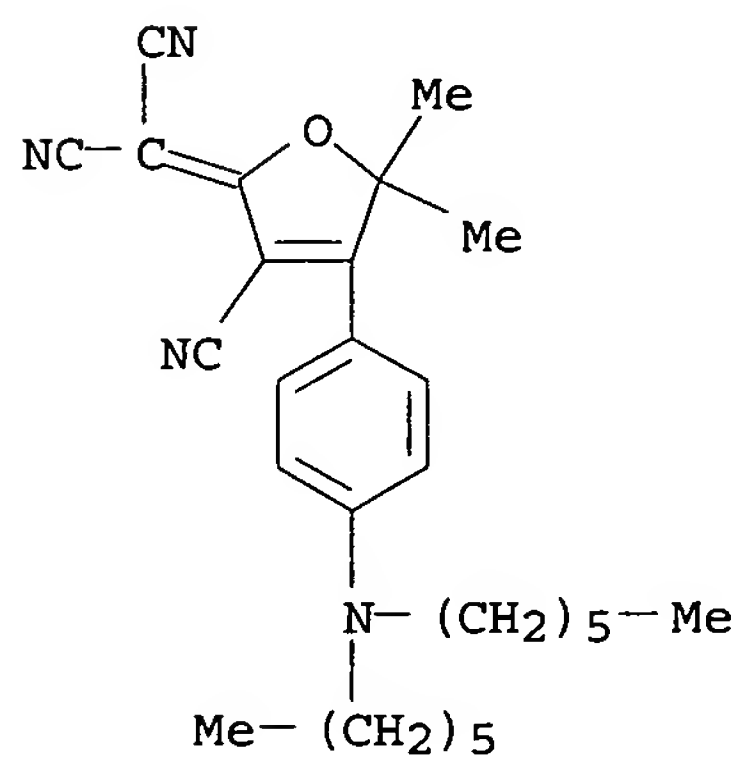
IT 402490-54-4

RL: PRP (Properties)

(DCDHF-6; photorefractive and phys. properties of)

RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



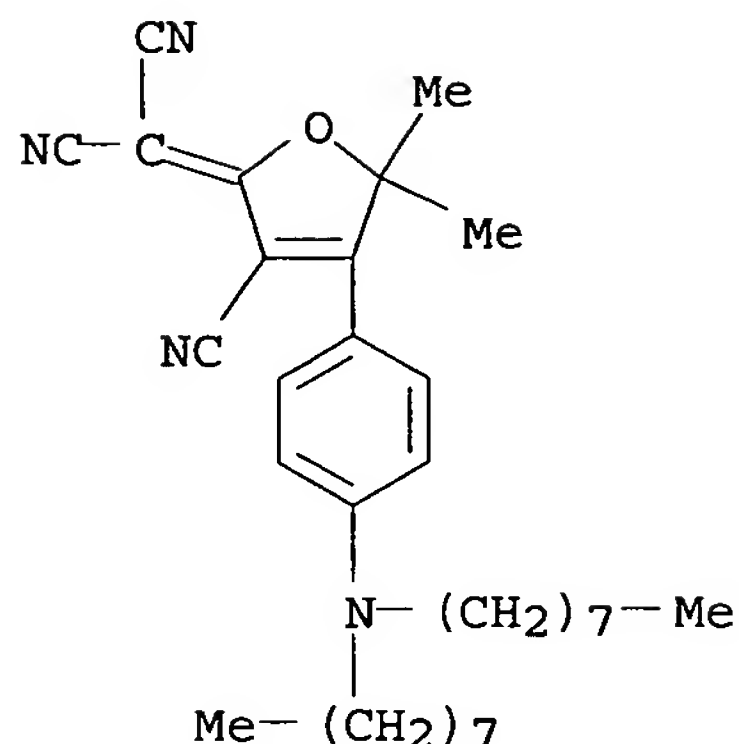
IT 481642-77-7

RL: PRP (Properties)

(DCDHF-8; photorefractive and phys. properties of)

RN 481642-77-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dioctylamino)phenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



L8 ANSWER 59 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:770496 HCAPLUS

DOCUMENT NUMBER: 138:97888

TITLE: Low-voltage electro-optic modulation using amorphous polycarbonate host material

AUTHOR(S): Ermer, Susan; Lovejoy, Steven M.; Bedworth, Peter V.; Leung, Doris S.; Warren, Hope B.; Epstein, Joseph A.; Girton, Dexter G.; Dries, Larry S.; Taylor, Rebecca E.; Barto, Richard R., Jr.; Eades, Wendell; Van Eck, Timothy E.; Moss, Angelina S.; Anderson, William W.

CORPORATE SOURCE: Lockheed Martin Advanced Technology Center, Palo Alto, CA, 94304-1191, USA

SOURCE: Advanced Functional Materials (2002), 12(9), 605-610

CODEN: AFMDC6; ISSN: 1616-301X

PUBLISHER: Wiley-VCH Verlag GmbH & Co. KGaA

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The selection process leading to the development of a guest-host electro-optic material based on an amorphous polycarbonate (APC) is described. The optical loss at 1300 nm of this material system is under 2 dB/cm, which is the confidence limit of the slab measurement used. A Mach-Zehnder modulator fabricated using the push-pull poling technique has a low switching voltage ( $V\pi$ ) of 1.2 V.

IT 473796-78-0P, Chromophore 46M

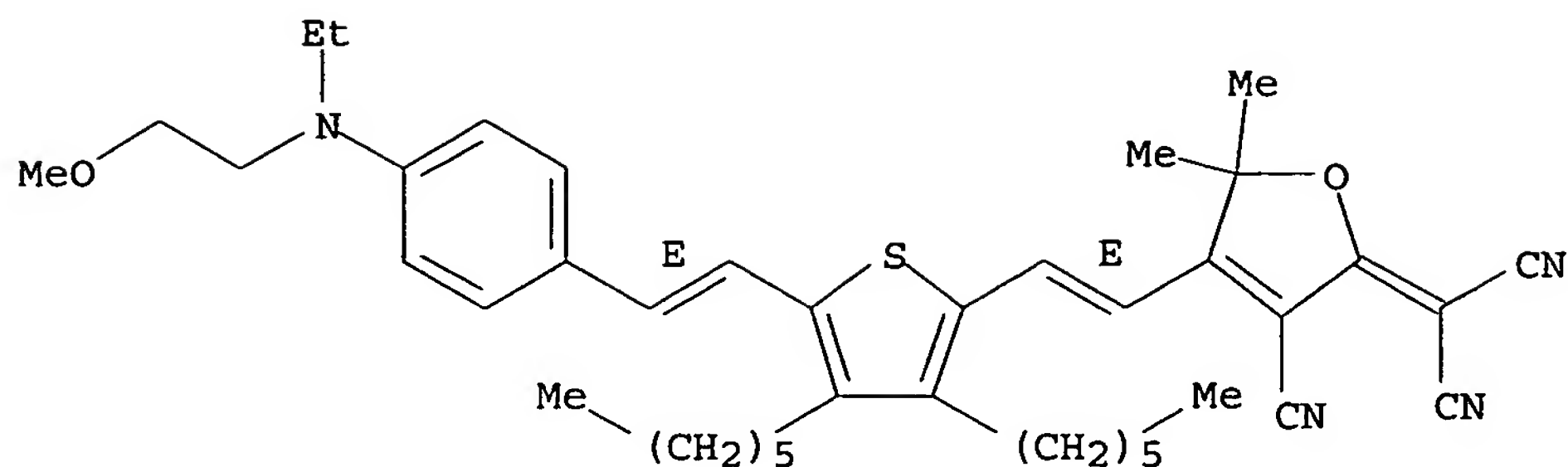
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); PROC (Process); USES (Uses)

(chromophore 46M; low-voltage electro-optic modulation using amorphous polycarbonate host material doped with chromophore 46M)

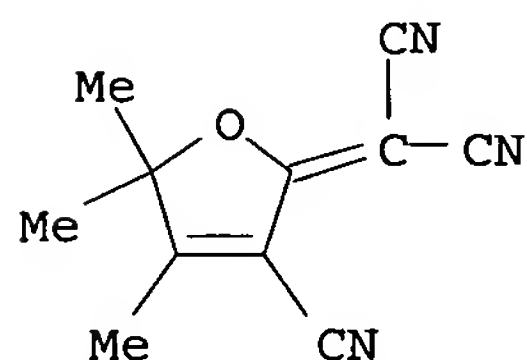
RN 473796-78-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(2E)-2-[5-[(2E)-2-[4-[ethyl(2-methoxyethyl)amino]phenyl]ethenyl]-3,4-dihexyl-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 171082-32-9P, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran  
 RL: PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
 (low-voltage electro-optic modulation using amorphous polycarbonate host material doped with chromophore 46M prepared using)  
 RN 171082-32-9 HCAPLUS  
 CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanlydene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 60 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2002:754374 HCAPLUS  
 DOCUMENT NUMBER: 137:286134  
 TITLE: Synthesis of fluorinated molecules possessing high optical non-linearity, e.g., 2-[4-[3-[3-[2-[4-[bis-[2-[(tert-butyldimethylsilyl)oxy]ethyl]amino]phenyl]vinyl]-5,5-dimethylcyclohex-2-enylidene]propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-5H-furan-2-ylidene]malononitrile, useful as chromophores in electro-optic devices  
 INVENTOR(S): Ermer, Susan; Lovejoy, Steven Michael; Bedworth, Peter V.  
 PATENT ASSIGNEE(S): Lockheed Martin Corporation, USA  
 SOURCE: PCT Int. Appl., 12 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002076969	A1	20021003	WO 2002-US9324	20020327

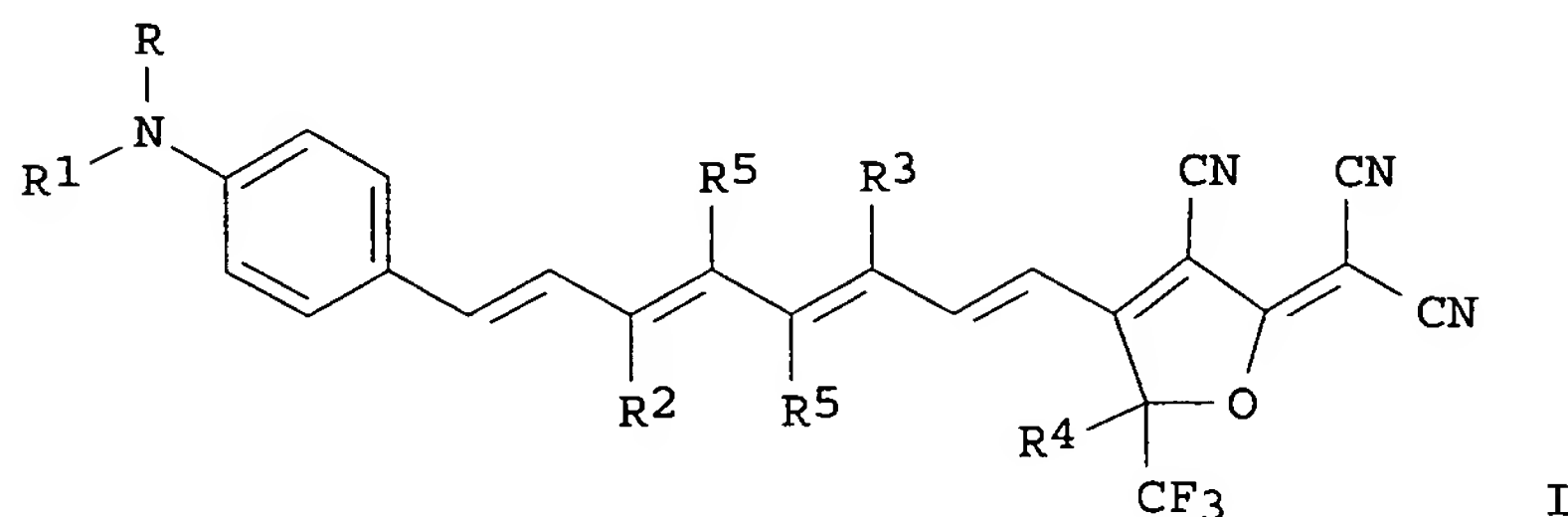
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CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH,  
 GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR,  
 LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH,  
 PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ,  
 UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU,  
 TJ, TM

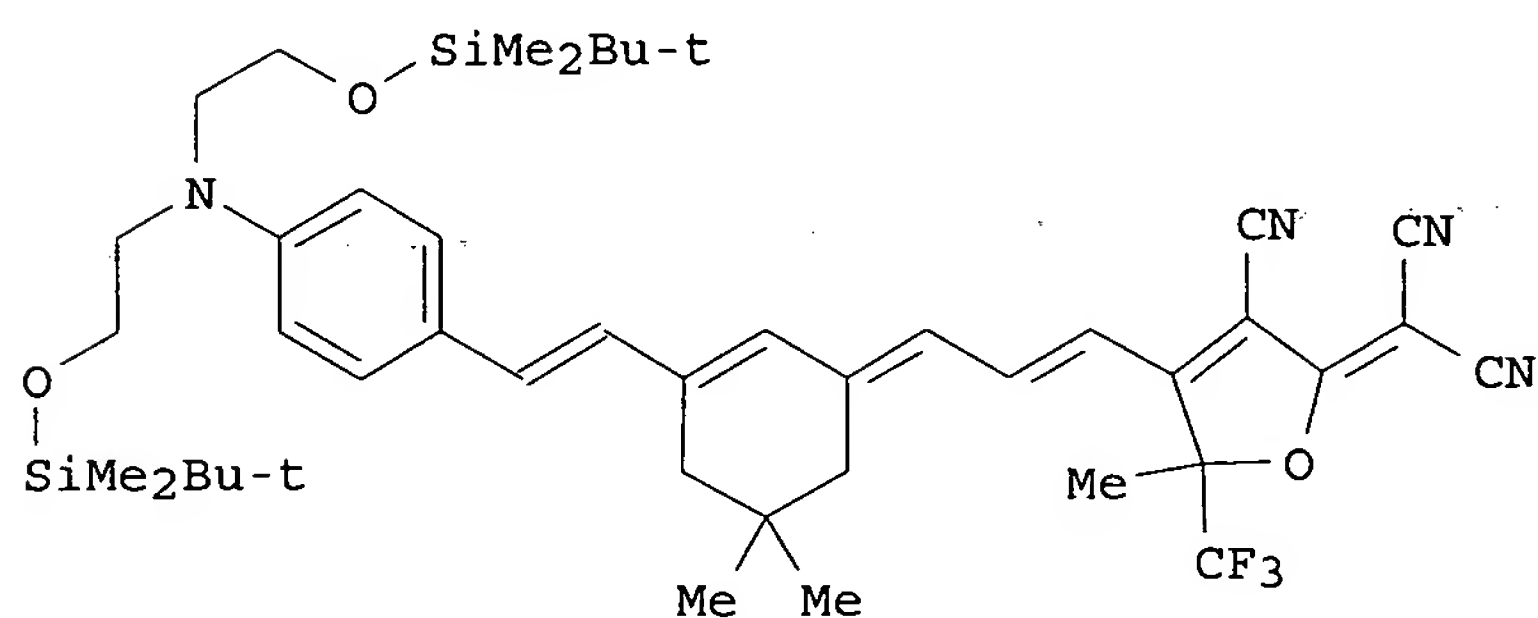
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, CH,  
 CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR,  
 BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

US 2004158084 A1 20040812 US 2004-473478 20040416  
 PRIORITY APPLN. INFO.: US 2001-278762P P 20010327  
 WO 2002-US9324 W 20020327

OTHER SOURCE(S): MARPAT 137:286134  
 GI



I



II

AB Invention compds. I [wherein R, R1-R5 can be selected from alkyl, aryl, heteroatom, substituted alkyl, or substituted aryl] are disclosed. The compds. are useful as chromophores in electro-optic devices (no data). A preferred invention compound is II, which can be prepared by Knoevenagel condensation of 2-(3-cyano-4,5-dimethyl-5-trifluoromethyl-5H-furan-2-ylidene)malononitrile (III) with the corresponding aldehyde. III is prepared in turn by reaction of 4,4,4-trifluoro-3-hydroxy-3-methylbutan-2-one with 2 equiv malononitrile in the presence of LiOH catalyst. Compds. I are said to show improvement over previous dyes because of the presence of the trifluoromethyl group on the acceptor portion of the mol. I can be poled at lower field, and have increased temporal stability (no data). Amorphous polycarbonate is reported to be a particularly useful polymer for incorporation of I.

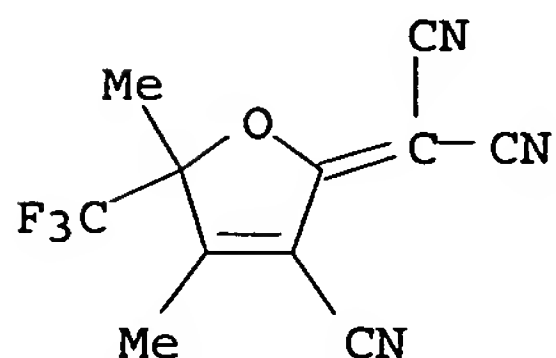
IT 369609-49-4P, 2-(3-Cyano-4,5-dimethyl-5-trifluoromethyl-5H-furan-2-ylidene)malononitrile  
 RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)



(intermediate; preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as nonlinear optical materials in electrooptical devices)

RN 369609-49-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



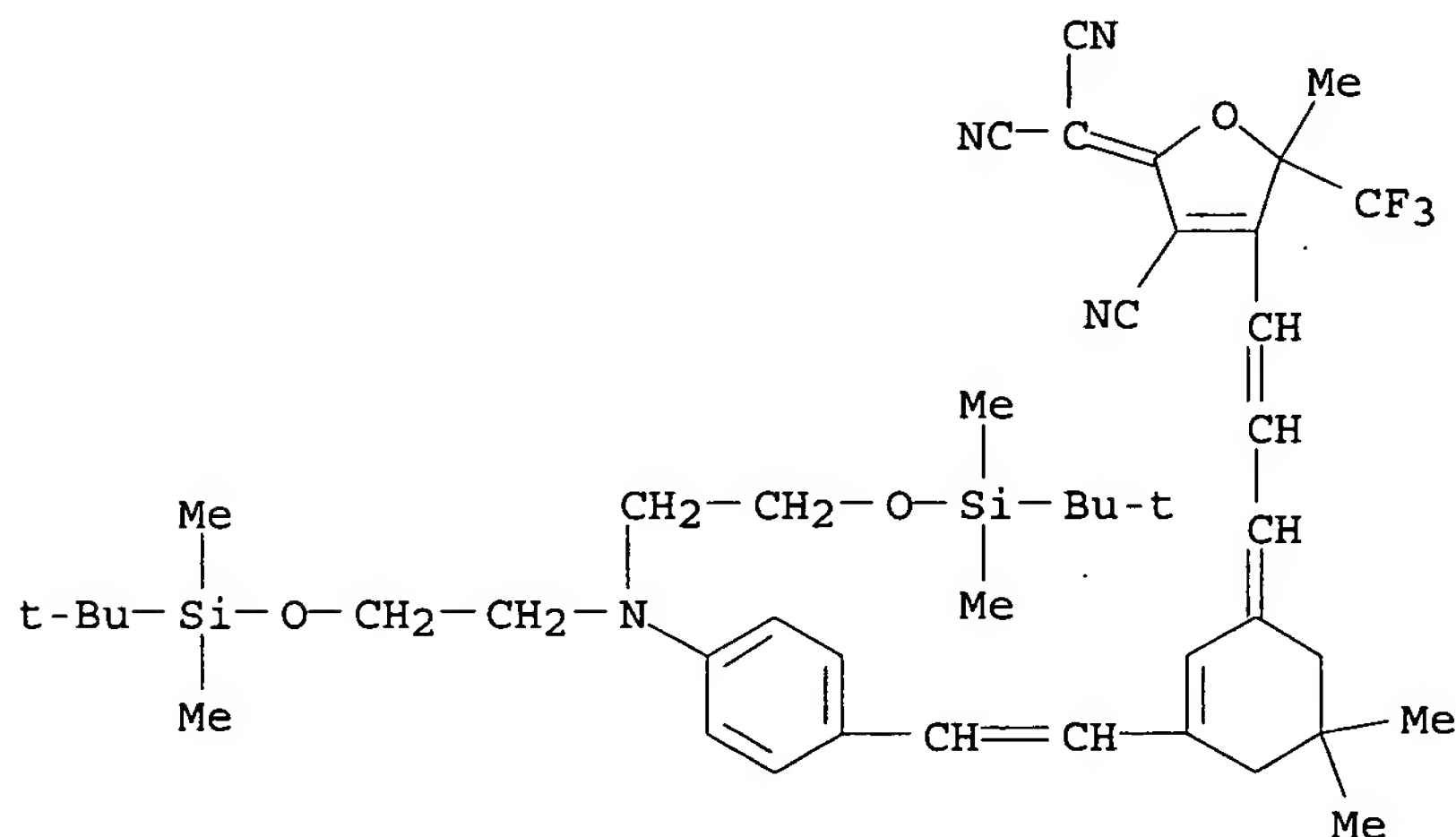
IT 369609-51-8P, 2-[4-[3-[3-[2-[4-[Bis-[2-[(tert-butyl)dimethylsilyl]oxy]ethyl]amino]phenyl]vinyl]-5,5-dimethylcyclohex-2-enylidene]propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-5H-furan-2-ylidene]malononitrile

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(invention compound; preparation of fluorinated furanylidene malononitrile derivs. as organic chromophores for use as nonlinear optical materials in electrooptical devices)

RN 369609-51-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 61 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:698042 HCAPLUS

DOCUMENT NUMBER: 138:188215

TITLE: Novel nonlinear optic polymers with thermal stability

AUTHOR(S): Kaino, Toshikuni; Ushiwata, Takami; Kaneko, Akihiro;  
Okamoto, Etsuya  
CORPORATE SOURCE: Institute of Multidisciplinary Research for Advanced  
Materials, Tohoku University, Aoba-ku, Sendai,  
980-8577, Japan  
SOURCE: Trends in Optics and Photonics (2002), 64(Organic Thin  
Films for Photonic Applications), 130-137  
CODEN: TOPRBS  
PUBLISHER: Optical Society of America  
DOCUMENT TYPE: Journal  
LANGUAGE: English

AB Several 2-dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran-  
azobenzene dye-containing poly(Me methacrylate) was prepared which has high  
optical nonlinearity and high thermal stability. The second order NLO  
susceptibility ( $\eta_{hi(2)33}$ ) of the polymer at 1.3  $\mu\text{m}$  fundamental  
wavelength was 43 pm/V, more than two times larger than that of the  
polymer containing dicyano-vinyl (DCV) acceptor and the same azobenzene  
structure. A derivative of poly(methacrylic acid) (PMA) was obtained by  
reaction with Disperse Red 1 (DR-1), via intermediate reaction of the acid  
and N,N'-dicyclohexylcarbodiimide. The glass transition temperature  $T_g$  of  
PMA-DR-1 is 170°, for DR-1 contents of 29 mol% and the  $\eta_{hi(2)33}$   
is 53 pm/V at 1.3  $\mu\text{m}$ . The PMA-DR-1 was further stabilized by heat  
treatment, which induced formation of methacrylimide structure; the  $T_g$  is  
165°, the  $\eta_{hi(2)33}$  is 45 pm/V at 1.3  $\mu\text{m}$ , which was about 90%  
of the initial after 230 h at 100°. Poly(aryl ether)s where  
electron-withdrawing groups for NLO activity were introduced into the  
polymers by post-functionalization were also prepared. These NLO poly(aryl  
ether)s have high  $T_g$ , typically higher than 200°. A 100 mol% DR-1  
dye-containing NLO polymer with fluorene structure has low optical propagation  
loss of 0.42 dB/cm at 1.3  $\mu\text{m}$  wavelength and shows low polarized light  
dependence of the refractive index. The polymer has  $\eta_{hi(2)33}$  of about  
57 pm/V at 1.3  $\mu\text{m}$  fundamental wavelength and the nonlinearity was  
stable at 100° for more than 200 h.

IT 444882-09-1P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(preparation of thermally stable (meth)acrylic polymers and poly(aryl  
ether)s containing cyano-azobenzene groups with second order NLO  
susceptibility)

RN 444882-09-1 HCAPLUS

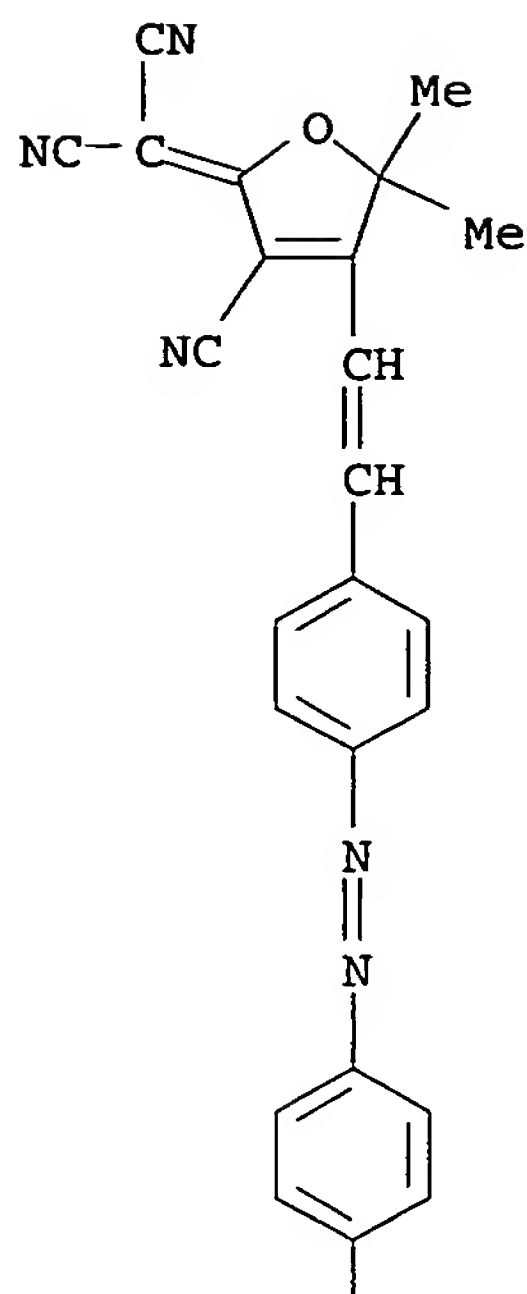
CN 2-Propenoic acid, 2-methyl-, 2-[[4-[[4-[2-[4-cyano-5-(dicyanomethylene)-  
2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]phenyl]azo]phenyl]ethylamino]et  
hyl ester, polymer with methyl 2-methyl-2-propenoate (9CI) (CA INDEX  
NAME)

CM 1

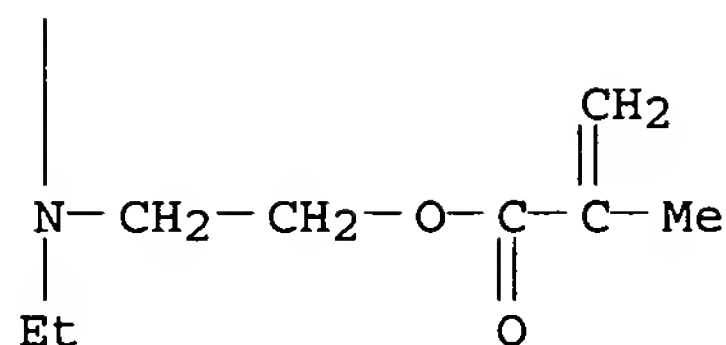
CRN 444882-08-0

CMF C32 H30 N6 O3

PAGE 1-A

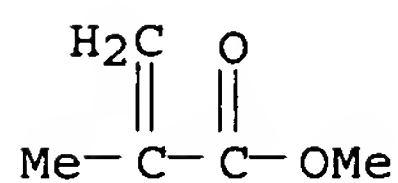


PAGE 2-A



CM 2

CRN 80-62-6  
CMF C5 H8 O2



REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 62 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
ACCESSION NUMBER: 2002:676310 HCAPLUS  
DOCUMENT NUMBER: 137:218033  
TITLE: Functional materials for use in optical systems, their production and chromophores therefor

INVENTOR(S): Drotleff, Elizabeth; McGinniss, Vincent D.; Risser, Steven M.; Spahr, Kevin Bruce  
 PATENT ASSIGNEE(S): Battelle Memorial Institute, USA  
 SOURCE: PCT Int. Appl., 232 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 6  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002069002	A1	20020906	WO 2002-US3582	20020206
W: AU, BR, CA, CN, CZ, ES, HU, ID, IL, JP, KR, MX, NO, NZ, PH, PL, RO, RU, SG, UA, US, VN, YU, ZA, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
US 2002185633	A1	20021212	US 2001-777439	20010206
US 6610219	B2	20030826		
EP 1368679	A1	20031210	EP 2002-709386	20020206
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
PRIORITY APPLN. INFO.:			US 2001-777439	A 20010206
			WO 2002-US3582	W 20020206

OTHER SOURCE(S): MARPAT 137:218033

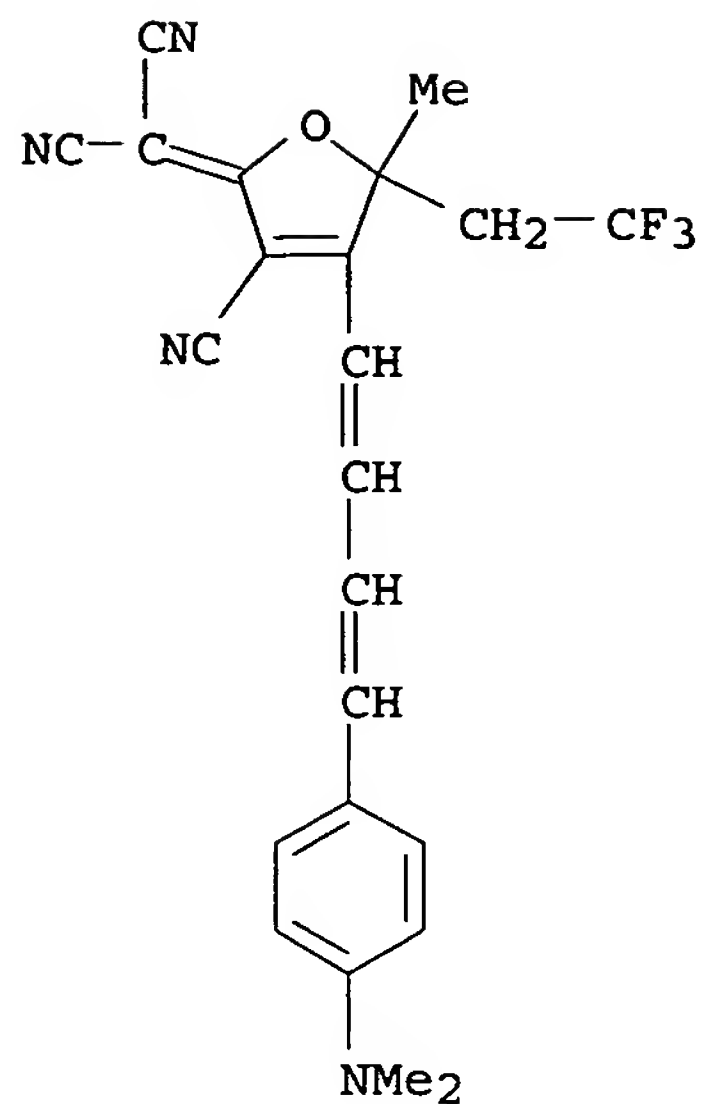
AB The present invention provides both polymer systems and optically active chromophores that may be used to form the components of optical devices such as optical switches and other devices useful in an optical waveguide. The polymers have glass transition temps. >100° and the systems have refractive index values of either 1.3-1.5 or 1.5-1.8 and have good compatibility with the electrooptical chromophores. In an example, an 8:2:30:60 acrylonitrile-3-(methacryloyloxy)propyltrimethoxysilane-Me methacrylate-trifluoroethyl methacrylate copolymer was prepared and combined with a 4-fluoro-3-nitroaniline chromophore to provide a low refractive index material.

IT 454702-64-8 454702-65-9 454702-66-0

RL: TEM (Technical or engineered material use); USES (Uses)  
 (chromophore; optical materials based on polymers and electrooptical chromophores)

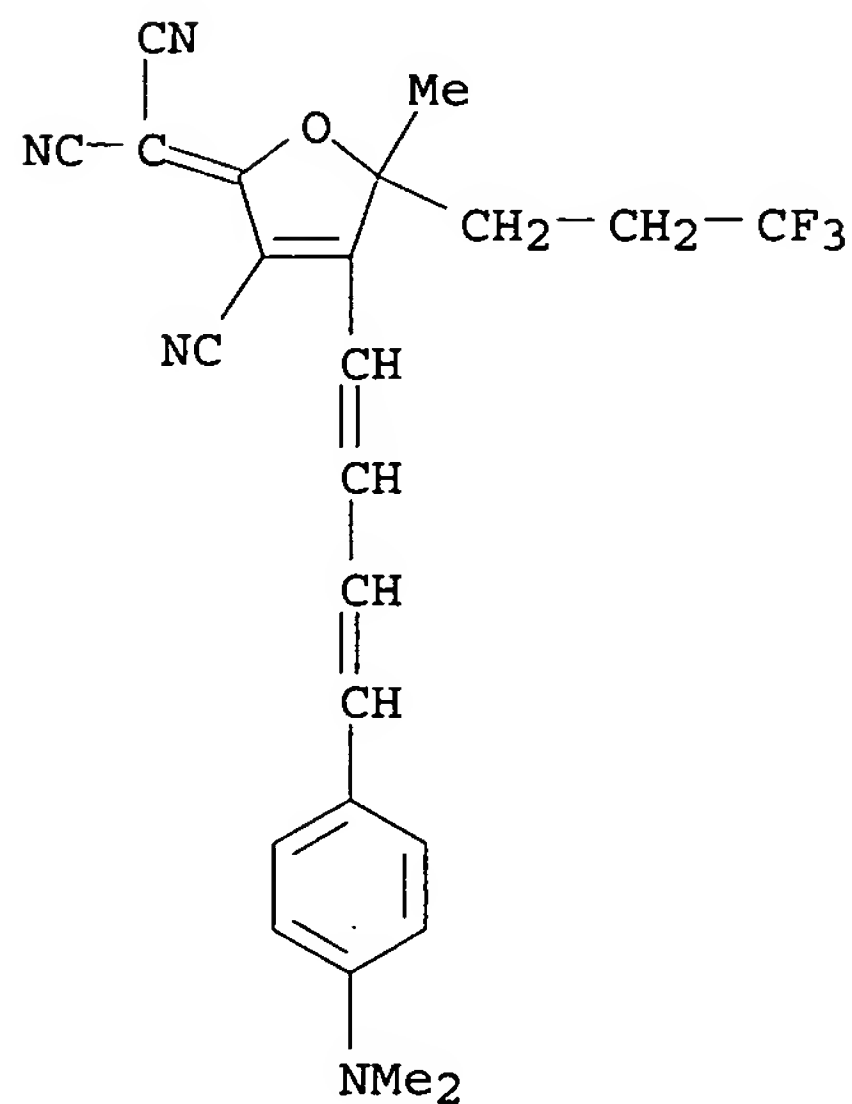
RN 454702-64-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-[4-(dimethylamino)phenyl]-1,3-butadienyl]-5-methyl-5-(2,2,2-trifluoroethyl)-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



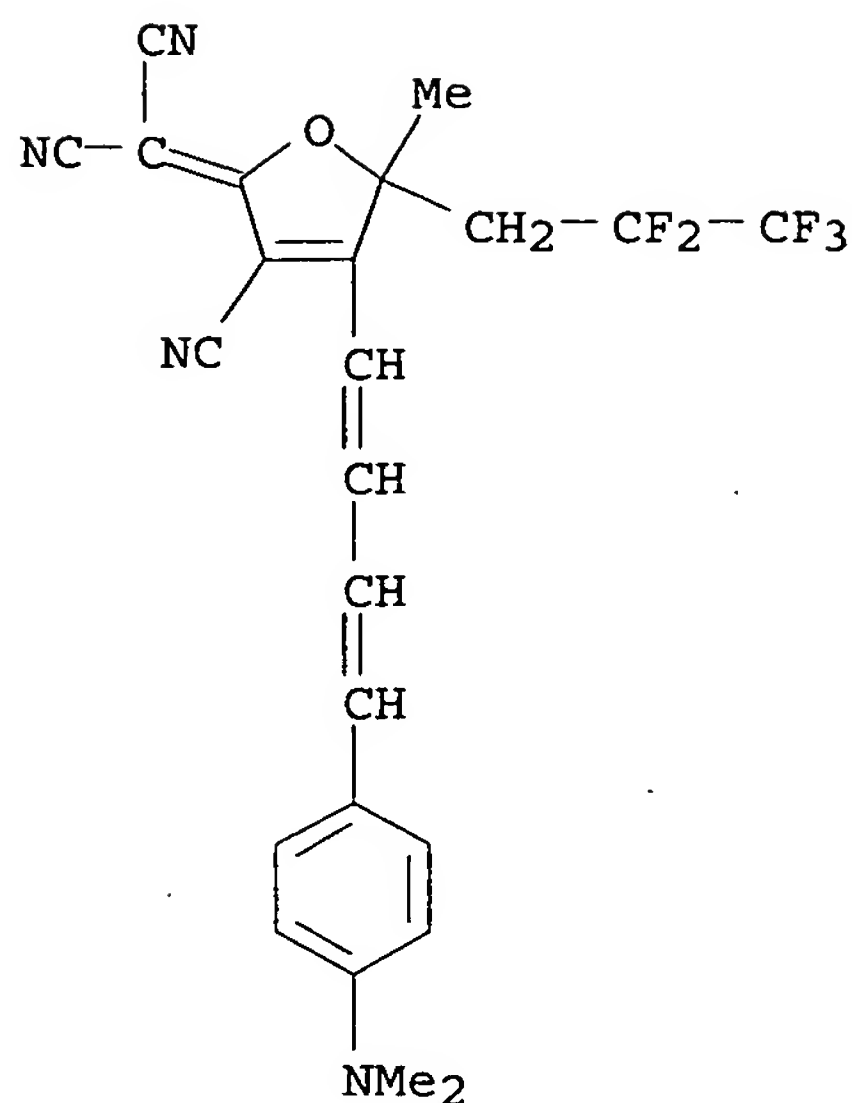
RN 454702-65-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-[4-(dimethylamino)phenyl]-1,3-butadienyl]-5-methyl-5-(3,3,3-trifluoropropyl)-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 454702-66-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-[4-(dimethylamino)phenyl]-1,3-butadienyl]-5-methyl-5-(2,2,3,3,3-pentafluoropropyl)-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

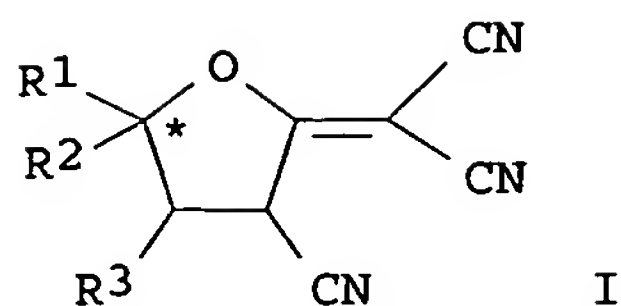


REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 63 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2002:669696 HCAPLUS  
 DOCUMENT NUMBER: 137:185402  
 TITLE: Novel electron acceptors for polymeric thin film waveguide media  
 INVENTOR(S): He, Mingqian; Leslie, Thomas M.  
 PATENT ASSIGNEE(S): Corning Incorporated, USA  
 SOURCE: U.S., 6 pp., Cont.-in-part of U.S. Ser. No. 596,069.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 2  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6444830	B1	20020903	US 2000-675967	20000929
US 6448416	B1	20020910	US 2000-596069	20000616
WO 2001098287	A1	20011227	WO 2001-US15826	20010516
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
EP 1289978	A1	20030312	EP 2001-935588	20010516
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
PRIORITY APPLN. INFO.:			US 2000-596069	A2 20000616
			US 2000-675967	A 20000929
			WO 2001-US15826	W 20010516
OTHER SOURCE(S):			CASREACT 137:185402	

GI

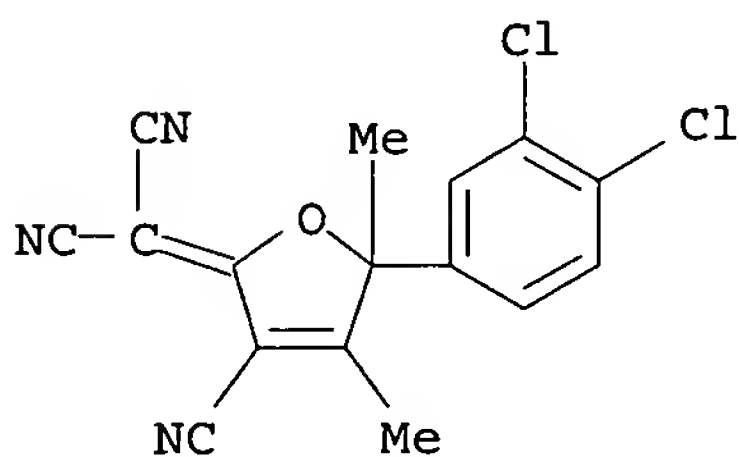


AB Compds. are claimed which are described by the general formula I (R1 = (un)substituted C1-10 alkyl, R2 = (un)substituted C2-10 alkyl, or R1 and R2 = independently selected (un)substituted C4-10 alkenyl, (un)substituted C4-10 alkynyl, (un)substituted aryl, (un)substituted alkylaryl, (un)substituted carbocycles, (un)substituted heterocycles, (un)substituted cyclohexyl, and (CH<sub>2</sub>)<sub>n</sub>-O-(CH<sub>2</sub>)<sub>n</sub>; n = 1-10; or R1 and R2 together form an (un)substituted ring structure, provided there are no methylene between the C\* to which R1 and R2 are bound and an sp<sup>2</sup> or sp hybridized carbon; and R3 = (un)substituted C1-4 alkyl, (un)substituted C1-4 alkenyl, or (un)substituted C1-4 alkynyl). Methods of preparing the compds. are described which entail providing an alkylvinylether; contacting the alkylvinylether with a strong base to form a first intermediate compound; contacting the first intermediate compound with a ketone to form a second intermediate compound; and reacting the second intermediate compound with dicyanomethane in the presence of a second base to form the compound Use in the preparation of polymeric thin films for waveguide media is indicated (no data).

IT 383124-82-1P, Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-furanlydene]-  
 RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (dicyanomethylenedihydrofuran derivs. and their preparation)

RN 383124-82-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 64 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:583015 HCAPLUS

DOCUMENT NUMBER: 138:17822

TITLE: A model of phase transitions in the system of electro-optical dipolar chromophores subject to an electric field

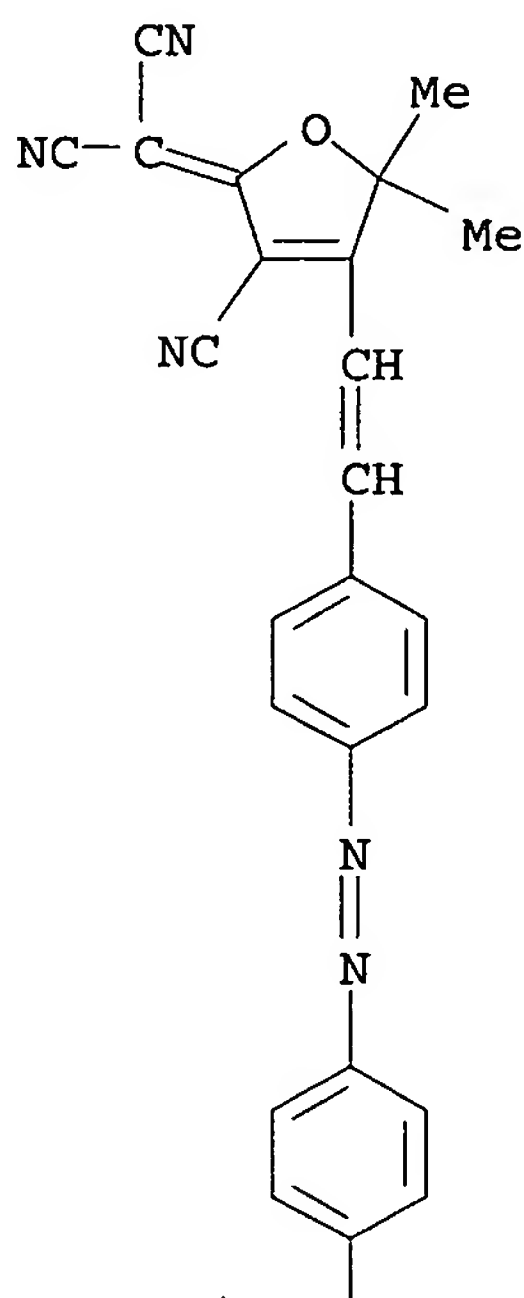
AUTHOR(S): Pereverzev, Yuriy V.; Prezhdo, Oleg V.; Dalton, Larry R.



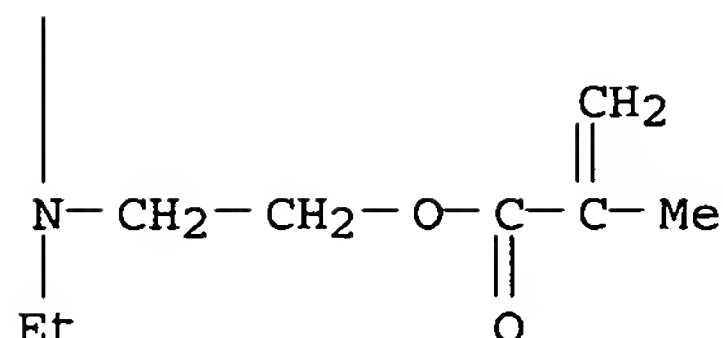


ACCESSION NUMBER: 2002:411332 HCAPLUS  
DOCUMENT NUMBER: 137:141821  
TITLE: Synthesis and characterization of novel side-chain nonlinear optical polymers with furan derivative as an acceptor  
AUTHOR(S): Kaneko, Akihiro; Okamoto, Etsuya; Kaino, Toshikuni  
CORPORATE SOURCE: Institute of Multidisciplinary Research for Advanced Materials, Tohoku University, Sendai, 980-8577, Japan  
SOURCE: Japanese Journal of Applied Physics, Part 2: Letters (2002), 41(5B), L559-L561  
CODEN: JAPLD8  
PUBLISHER: Japan Society of Applied Physics  
DOCUMENT TYPE: Journal  
LANGUAGE: English  
OTHER SOURCE(S): CASREACT 137:141821  
AB A novel azo-dye-attached nonlinear optical (NLO) polymer with a furan derivative as an acceptor is synthesized and its optical properties are investigated. The acceptor shows a strong ability to enhance the second-order optical nonlinearity of PMMA base NLO polymer. The d33 value of the furan derivative acceptor polymer was more than twice as large as that of the PMMA base NLO polymer with a dicyanovinyl acceptor with the same azobenzene structure.  
IT 444882-08-0P  
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)  
(dye/monomer; preparation and polymerization of azo dye-based NLO methacrylate monomer)  
RN 444882-08-0 HCAPLUS  
CN 2-Propenoic acid, 2-methyl-, 2-[[4-[[4-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]phenyl]azo]phenyl]ethylamino]ethyl ester (9CI) (CA INDEX NAME)

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IT 171082-32-9, 2-(Dicyanomethylene)-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran

RL: RCT (Reactant); RACT (Reactant or reagent)

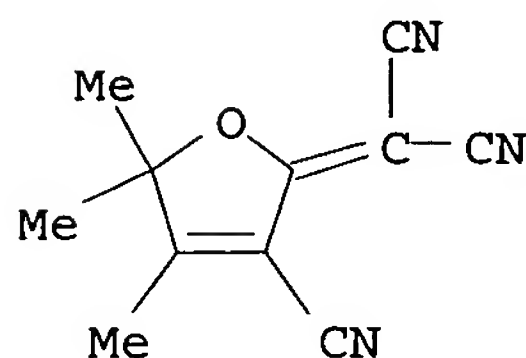
(monomer starting material; preparation and polymerization of azo dye-based

NLO

methacrylate monomer)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



IT 444882-09-1P

RL: PRP (Properties); SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(preparation and properties of azo dye-based NLO methacrylate copolymers)

RN 444882-09-1 HCAPLUS

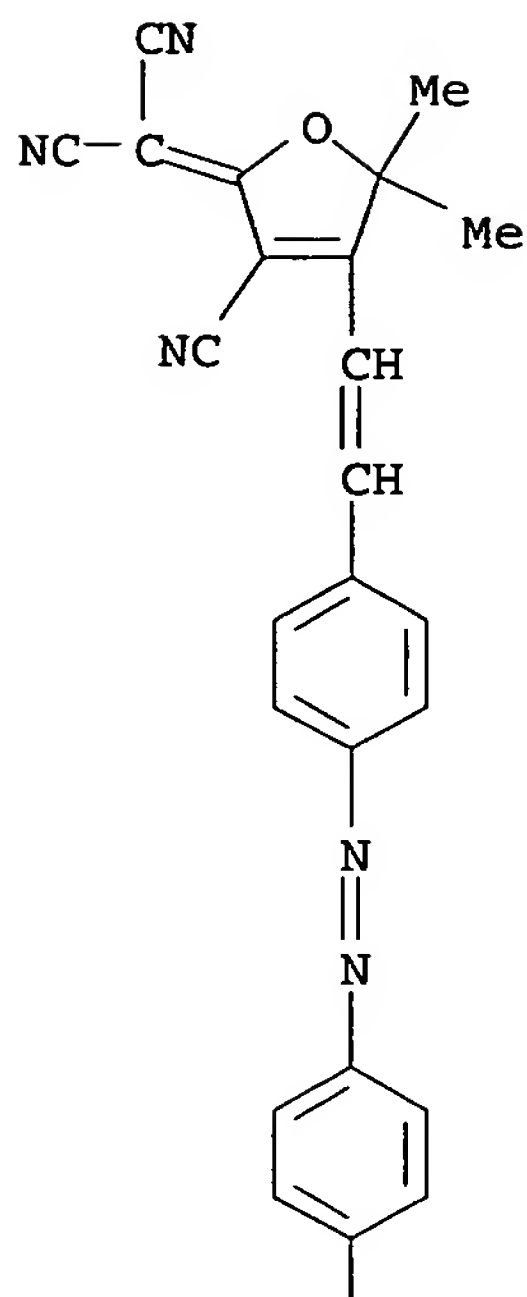
CN 2-Propenoic acid, 2-methyl-, 2-[[4-[[4-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]phenyl]azo]phenyl]ethylamino]ethyl ester, polymer with methyl 2-methyl-2-propenoate (9CI) (CA INDEX NAME)

CM 1

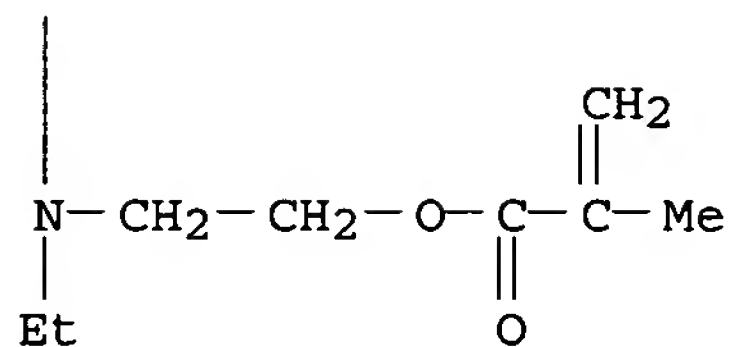
CRN 444882-08-0

CMF C32 H30 N6 O3

PAGE 1-A

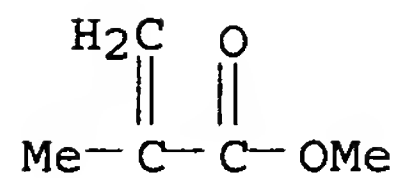


PAGE 2-A



CM 2

CRN 80-62-6  
CMF C5 H8 O2



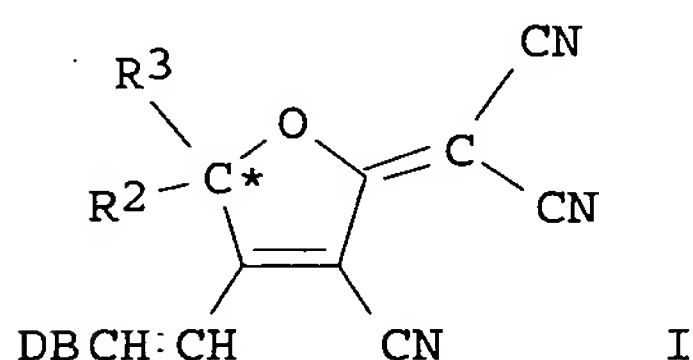
REFERENCE COUNT: 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 66 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
ACCESSION NUMBER: 2002:387664 HCAPLUS  
DOCUMENT NUMBER: 136:387425  
TITLE: Chromophores for polymeric thin films and optical waveguides and devices comprising the same

INVENTOR(S): He, Mingqian; Leslie, Thomas M.  
 PATENT ASSIGNEE(S): Corning Incorporated, USA  
 SOURCE: U.S., 16 pp., Cont.-in-part of U.S. Ser. No. 595,221.  
 CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 2  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6393190	B1	20020521	US 2000-675966	20000929
US 6584266	B1	20030624	US 2000-595221	20000616
CA 2411963	AA	20011227	CA 2001-2411963	20010516
WO 2001098310	A1	20011227	WO 2001-US15827	20010516
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
EP 1290000	A1	20030312	EP 2001-937449	20010516
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2004501159	T2	20040115	JP 2002-504265	20010516
PRIORITY APPLN. INFO.:				
			US 2000-595221	A2 20000616
			US 2000-675966	A 20000929
			WO 2001-US15827	W 20010516

OTHER SOURCE(S): MARPAT 136:387425  
 GI



AB Compds. are claimed which are described by the general formula I (R2 and R3 = rings in which \* denotes a spiro junction or a chiral center; D = electron donating group; B is or contains  $\geq 1$  bivalent aromatic ring; and R2 and R3 = independently selected (un)substituted C1-10 alkyl, (un)substituted C2-10 alkenyl, (un)substituted C2-10 alkynyl, (un)substituted aryl, (un)substituted alkylaryl, (un)substituted carbocyclic, (un)substituted heterocyclic, (un)substituted cyclohexyl, or (CH<sub>2</sub>)<sub>n</sub>O(CH<sub>2</sub>)<sub>n</sub>; and n = 1-10). Methods for preparing the electron-withdrawing groups are described. Optical waveguides comprising polymers incorporating the compds., and optical devices (e.g, laser frequency converters, optical interferometric waveguide gates, wideband electrooptical guided wave analog-to-digital converters, and optical parametric devices) incorporating the waveguides, are also described.

IT 383124-87-6P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(furan derivative chromophores for polymeric thin films and their production and optical waveguides and devices comprising them)

RN 383124-87-6 HCAPLUS

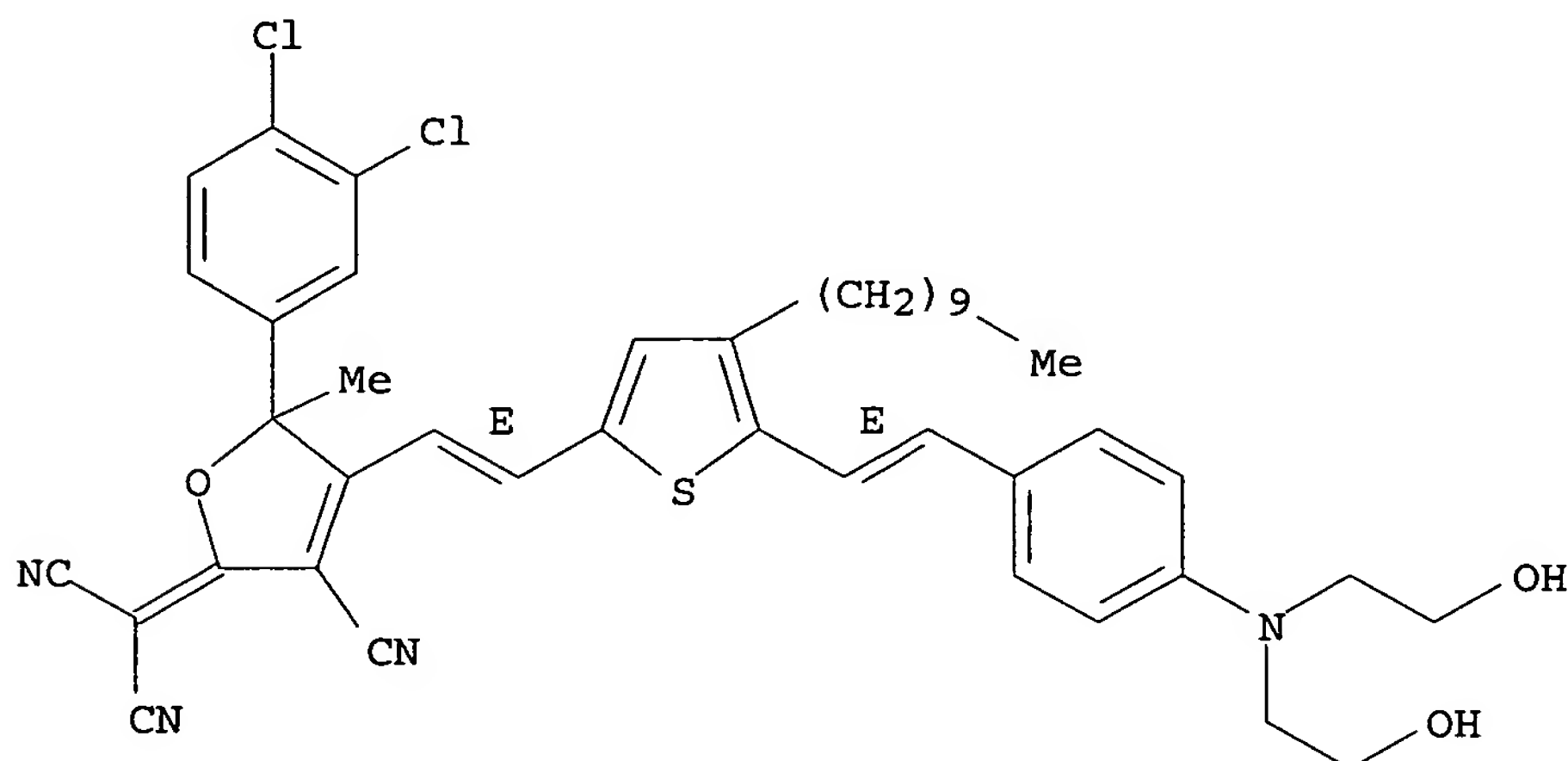
CN Bicyclo[2.2.1]hept-5-ene-2,3-dicarbonyl dichloride, 1,4,5,6,7,7-hexachloro-, polymer with [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-4-decyl-2-thienyl]ethenyl]-3-cyano-5-(3,4-dichlorophenyl)-5-methyl-2(5H)-furanylidene]propanedinitrile and 2,3,5,6-tetrachloro-1,4-benzenedimethanol (9CI) (CA INDEX NAME)

CM 1

CRN 383124-85-4

CMF C43 H46 Cl2 N4 O3 S

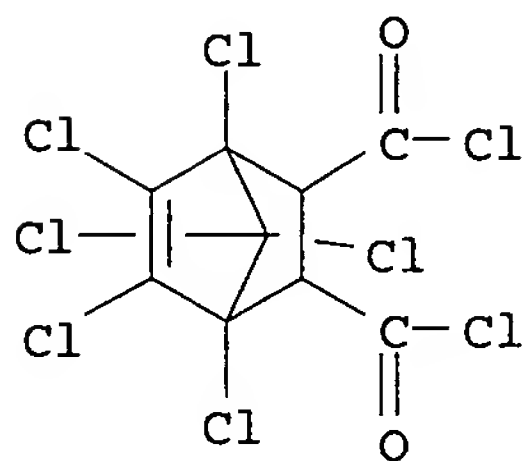
Double bond geometry as shown.



CM 2

CRN 16673-09-9

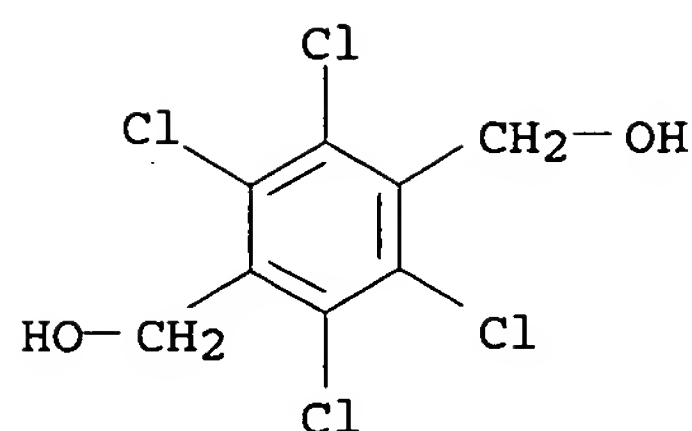
CMF C9 H2 Cl8 O2



CM 3

CRN 7154-26-9

CMF C8 H6 Cl4 O2



IT 383124-85-4P

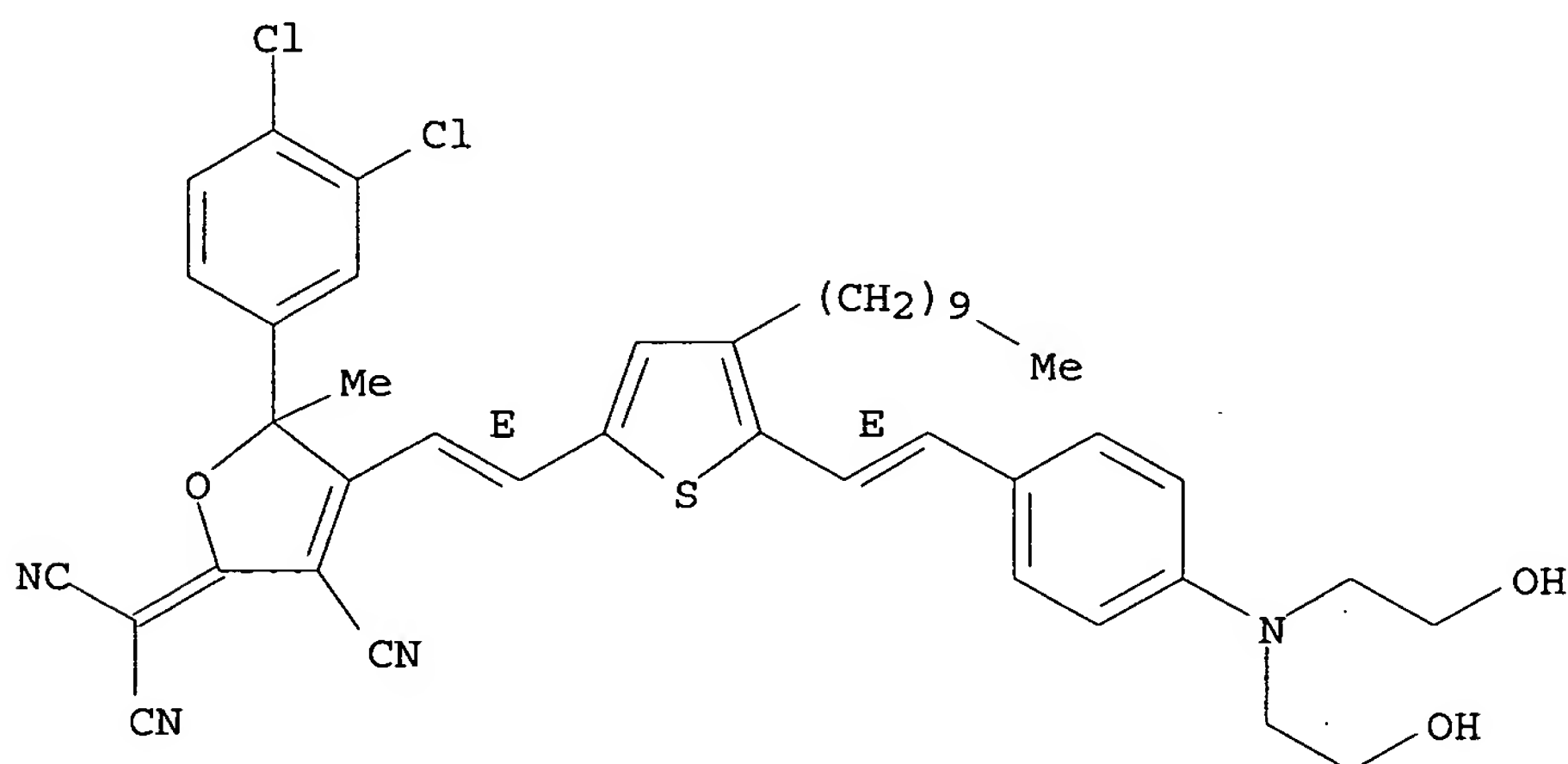
RL: IMF (Industrial manufacture); RCT (Reactant); TEM (Technical or engineered material use); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)

(monomer chromophore; production of intermediates for electrooptical chromophores)

RN 383124-85-4 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-4-decyl-2-thienyl]ethenyl]-3-cyano-5-(3,4-dichlorophenyl)-5-methyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as shown.



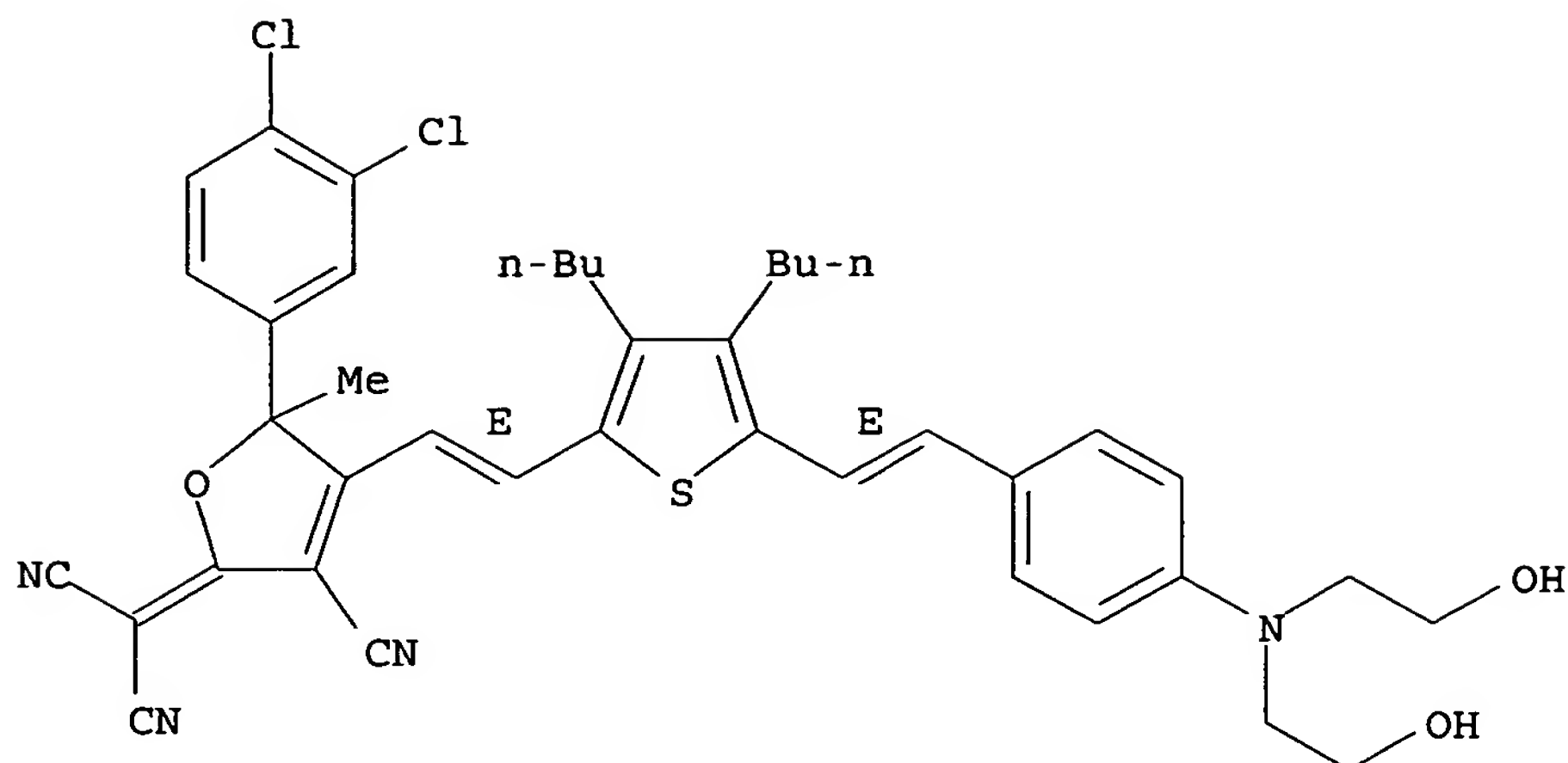
IT 383124-86-5P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(monomeric chromophore; production of intermediates for electrooptical chromophores)

RN 383124-86-5 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5-(3,4-dichlorophenyl)-5-methyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as shown.



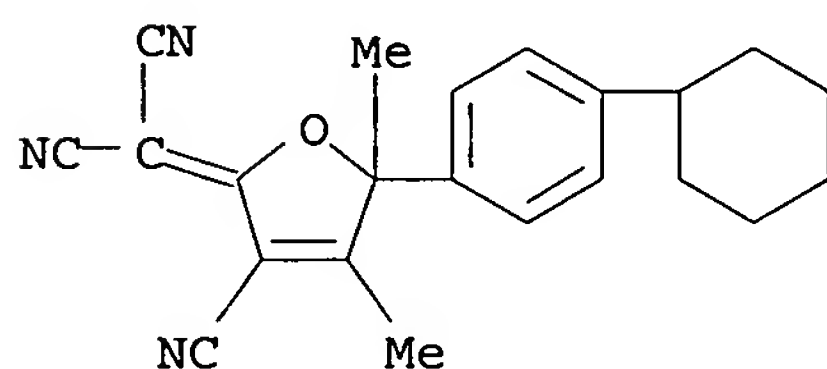
IT 383124-80-9P 383124-89-8P 426840-97-3P

RL: IMF (Industrial manufacture); PREP (Preparation)

(production of intermediates for electrooptical chromophores)

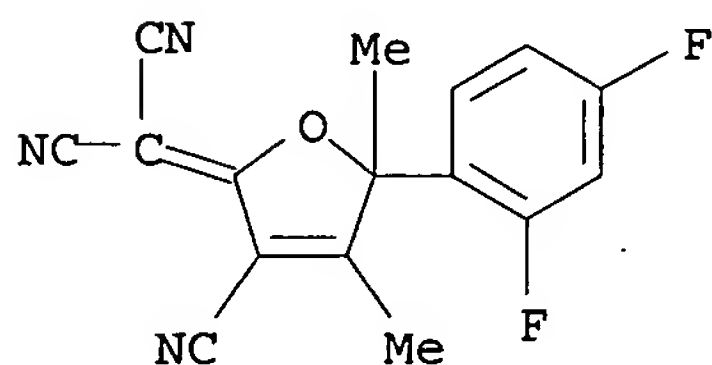
RN 383124-80-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



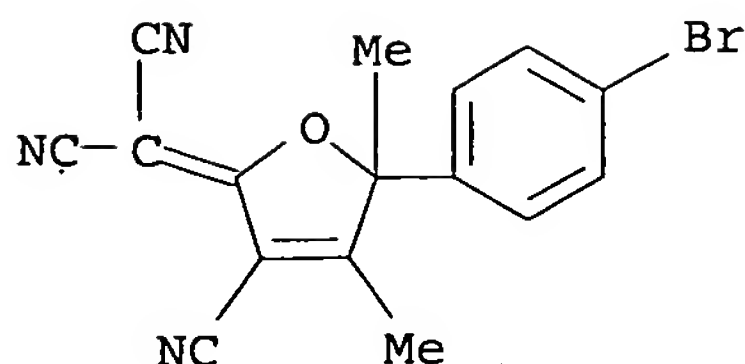
RN 383124-89-8 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(2,4-difluorophenyl)-4,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 426840-97-3 HCAPLUS

CN Propanedinitrile, [5-(4-bromophenyl)-3-cyano-4,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



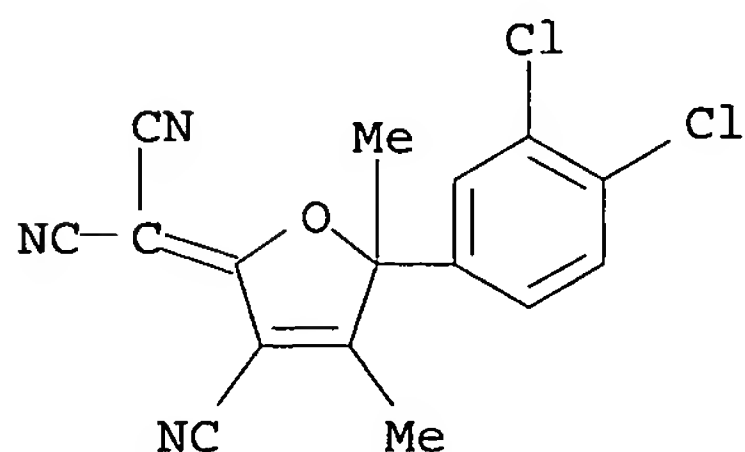
IT 383124-82-1P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(production of intermediates for electrooptical chromophores)

RN 383124-82-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT:

28

THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 67 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:285439 HCAPLUS

DOCUMENT NUMBER: 137:33052

TITLE:  $\alpha$ -Hydroxy Ketone Precursors Leading to a Novel Class of Electro-optic Acceptors

AUTHOR(S): He, Mingqian; Leslie, Thomas M.; Sinicropi, John A.

CORPORATE SOURCE: Corning Incorporated, Corning, NY, 14831, USA

SOURCE: Chemistry of Materials (2002), 14(5), 2393-2400

CODEN: CMATEX; ISSN: 0897-4756

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

OTHER SOURCE(S): CASREACT 137:33052

AB A facile high-yield synthetic route has been established for the synthesis of  $\alpha$ -hydroxy Me ketones. These intermediates are important precursors to the tricyanovinylidihydrofuran type of acceptor used in high  $\mu\beta$  nonlinear optical chromophores. 3-Hydroxy-3-methyl-2-butanone is one of only three com. available precursors of this type, limiting the chemist from making systematic studies of structure property relationships. This very general synthetic method allows a wide variety of  $\alpha$ -hydroxy ketone structures to be easily made.

IT 436097-18-6P

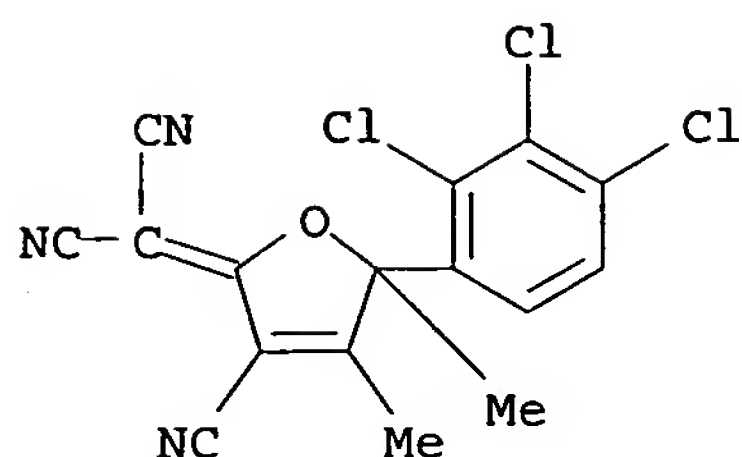
RL: PNU (Preparation, unclassified); PREP (Preparation)

(attempted preparation; preparation of  $\alpha$ -hydroxy ketone precursors leading to novel class of electrooptic acceptors)

RN 436097-18-6 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(2,3,4-trichlorophenyl)-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



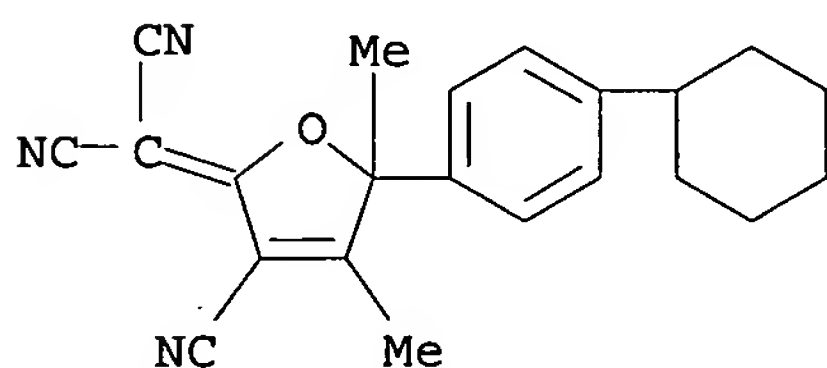


IT 383124-80-9P 383124-82-1P 383124-88-7P  
383124-89-8P 436097-12-0P 436097-13-1P  
436097-14-2P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(preparation of  $\alpha$ -hydroxy ketone precursors leading to novel class of  
electrooptic acceptors)

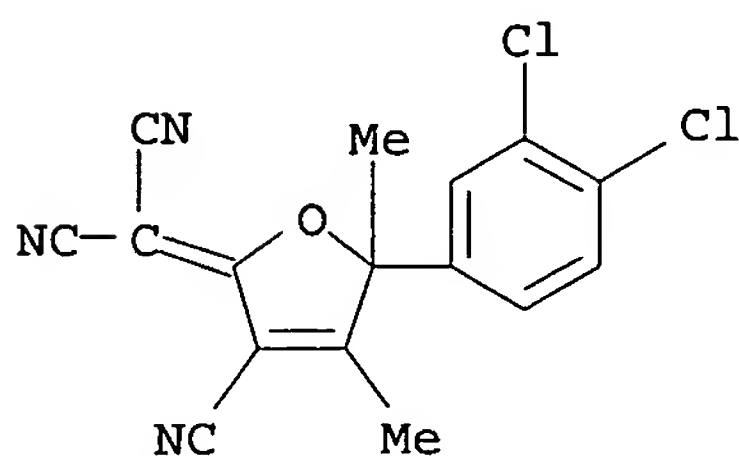
RN 383124-80-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4,5-dimethyl-2(5H)-  
furan-2-ylidene]- (9CI) (CA INDEX NAME)



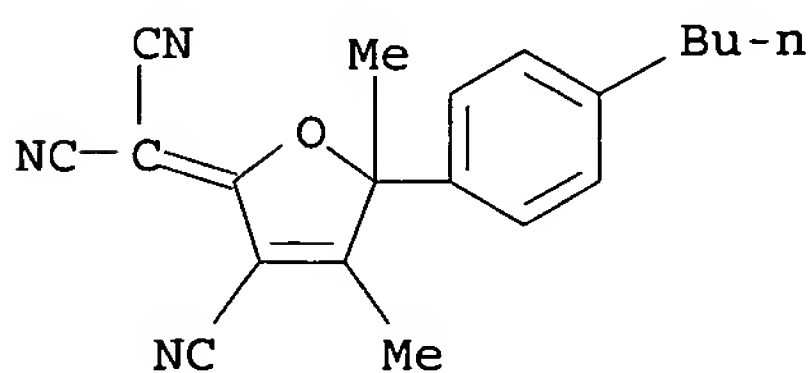
RN 383124-82-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-  
furan-2-ylidene]- (9CI) (CA INDEX NAME)



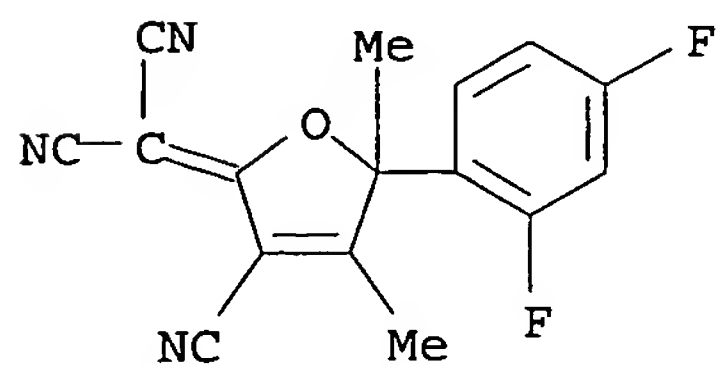
RN 383124-88-7 HCAPLUS

CN Propanedinitrile, [5-(4-butylphenyl)-3-cyano-4,5-dimethyl-2(5H)-  
furan-2-ylidene]- (9CI) (CA INDEX NAME)



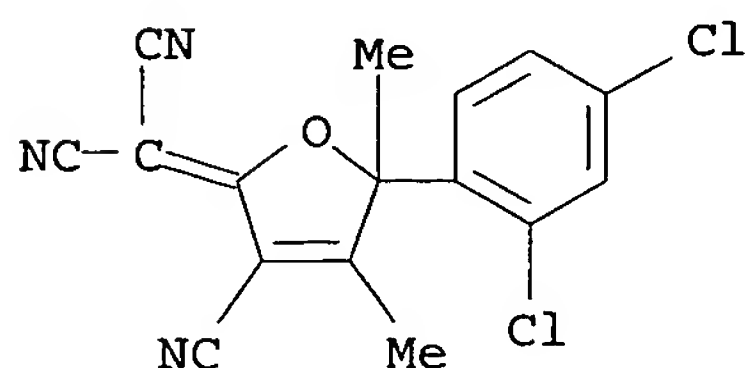
RN 383124-89-8 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(2,4-difluorophenyl)-4,5-dimethyl-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



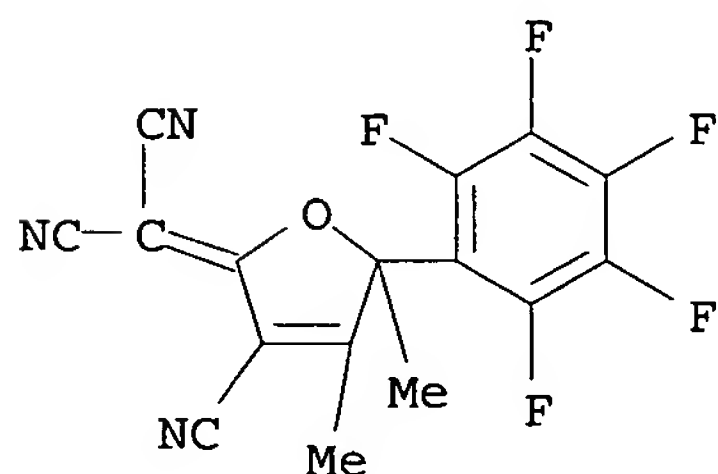
RN 436097-12-0 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(2,4-dichlorophenyl)-4,5-dimethyl-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



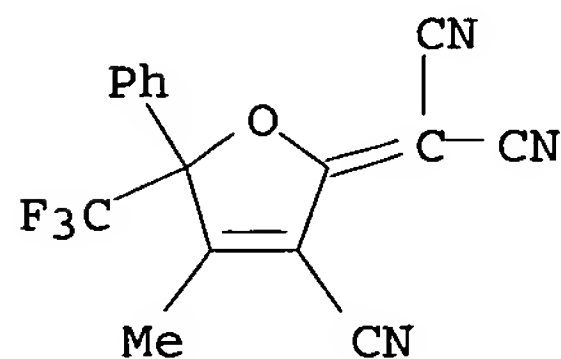
RN 436097-13-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(pentafluorophenyl)-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



RN 436097-14-2 HCAPLUS

CN Propanedinitrile, [3-cyano-4-methyl-5-phenyl-5-(trifluoromethyl)-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT:

21

THERE ARE 21 CITED REFERENCES AVAILABLE FOR THIS

## RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 68 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2002:276292 HCAPLUS  
 DOCUMENT NUMBER: 136:316685  
 TITLE: Polymers containing polyene-bridged second-order  
 nonlinear optical chromophores and devices  
 incorporating the same  
 INVENTOR(S): Zhang, Cheng; Fetterman, Harold R.; Steier, William;  
 Michael, Joseph  
 PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA  
 SOURCE: PCT Int. Appl., 53 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 10  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002029488	A1	20020411	WO 2001-US29239	20010918
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
US 6652779	B1	20031125	US 2000-679937	20001005
AU 2001092779	A5	20020415	AU 2001-92779	20010918
PRIORITY APPLN. INFO.:			US 2000-679937	A 20001005
			US 1998-122806	A2 19980727
			US 2000-488422	A2 20000120
			US 2000-546930	A2 20000411
			US 2000-551685	A2 20000418
			WO 2001-US29239	W 20010918

AB Second-order nonlinear optical device comprising an active element including a linear chain nonlinear optical polyester or poly(imide ester) formed by reacting a dihydroxy functionalized chromophore containing a  $\pi$ -conjugate polyene structure as the bridge or part of the bridge that connects an electron donor and electron acceptor with a monomer selected from an aromatic or aliphatic diacid or diacid dihalide and a monomer selected from an aromatic or aliphatic diol. The polyesters may be crosslinked using trifluoroether groups. Second-order nonlinear optical devices are also described which comprise an active element including a crosslinked nonlinear optical polymer material formed from dendritic or hyperbranched macromol. that carries  $\geq 1$  chromophores and thermally reactive groups at the periphery of the macromol. for crosslinking between the macromols. The dendrimers may each have a chromophore as the core and  $\geq 1$  dendrons that carry thermally reactive groups for crosslinking between the dendrimers. Tetrafluoroisophthaloyl dichloride.

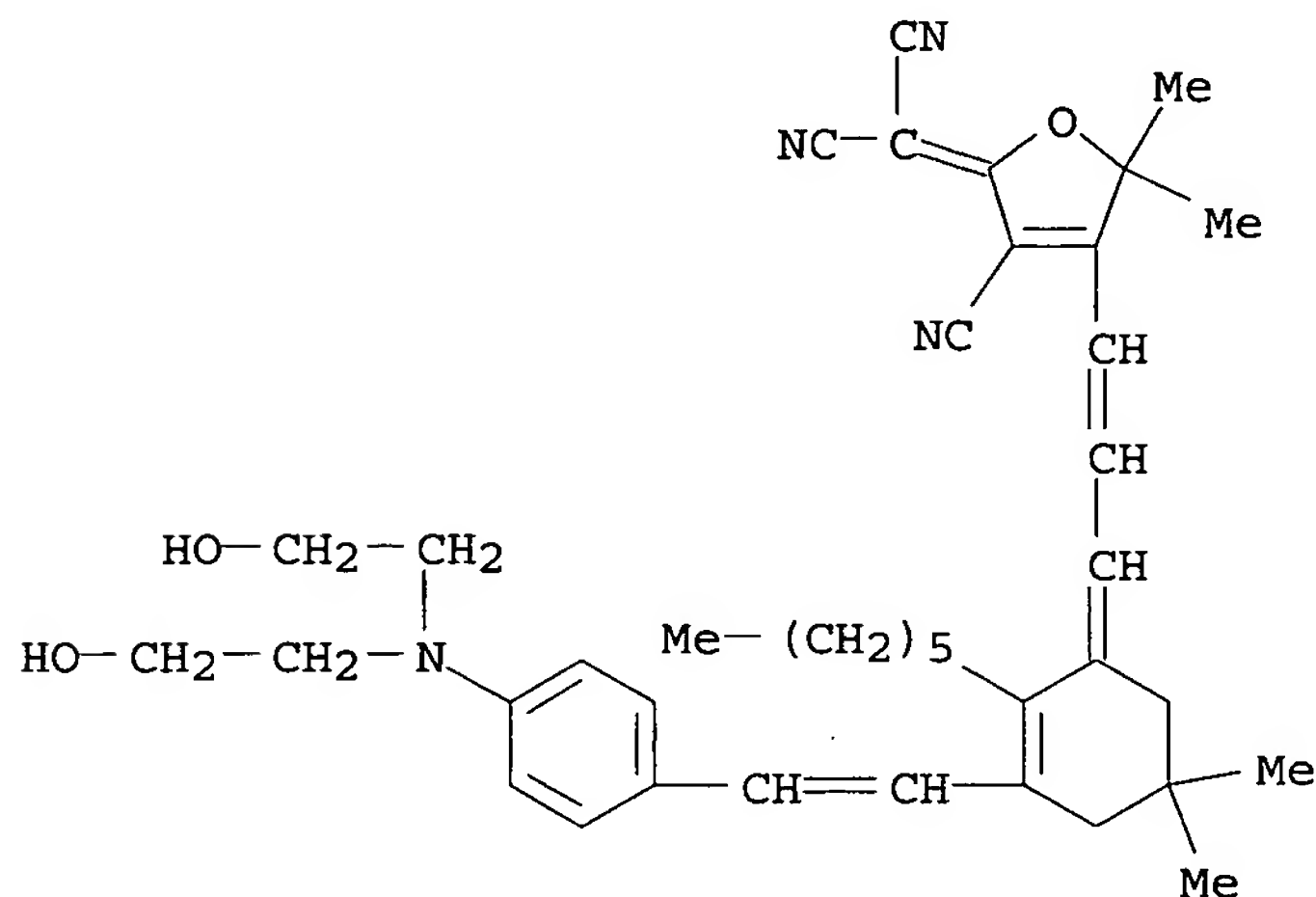
IT 259653-89-9P 410093-47-9P  
 RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)  
 (second-order nonlinear optical devices employing polymers containing polyene-bridged second-order nonlinear optical chromophores)  
 RN 259653-89-9 HCAPLUS

CN 1,3-Benzenedicarbonyl dichloride, 2,4,5,6-tetrafluoro-, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

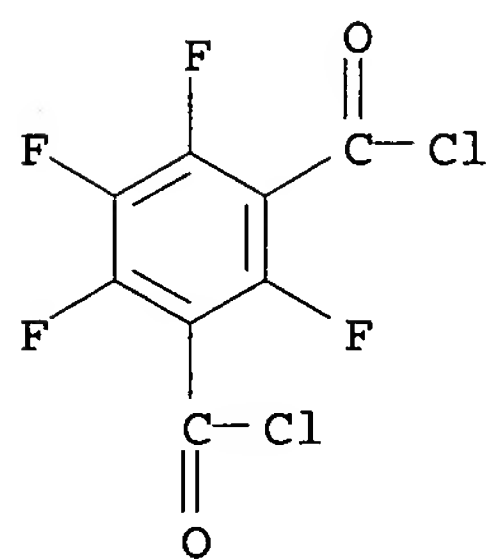
CMF C39 H48 N4 O3



CM 2

CRN 110649-97-3

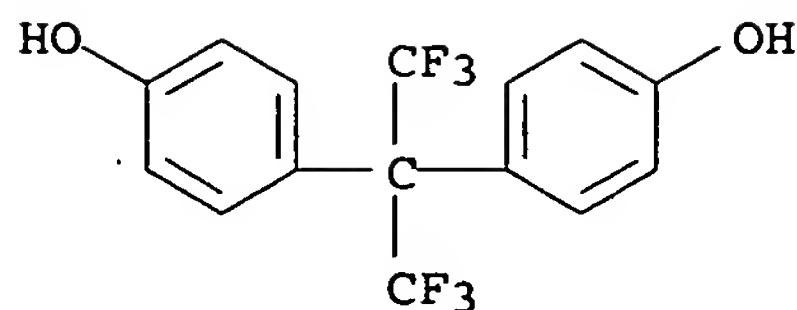
CMF C8 Cl2 F4 O2



CM 3

CRN 1478-61-1

CMF C15 H10 F6 O2



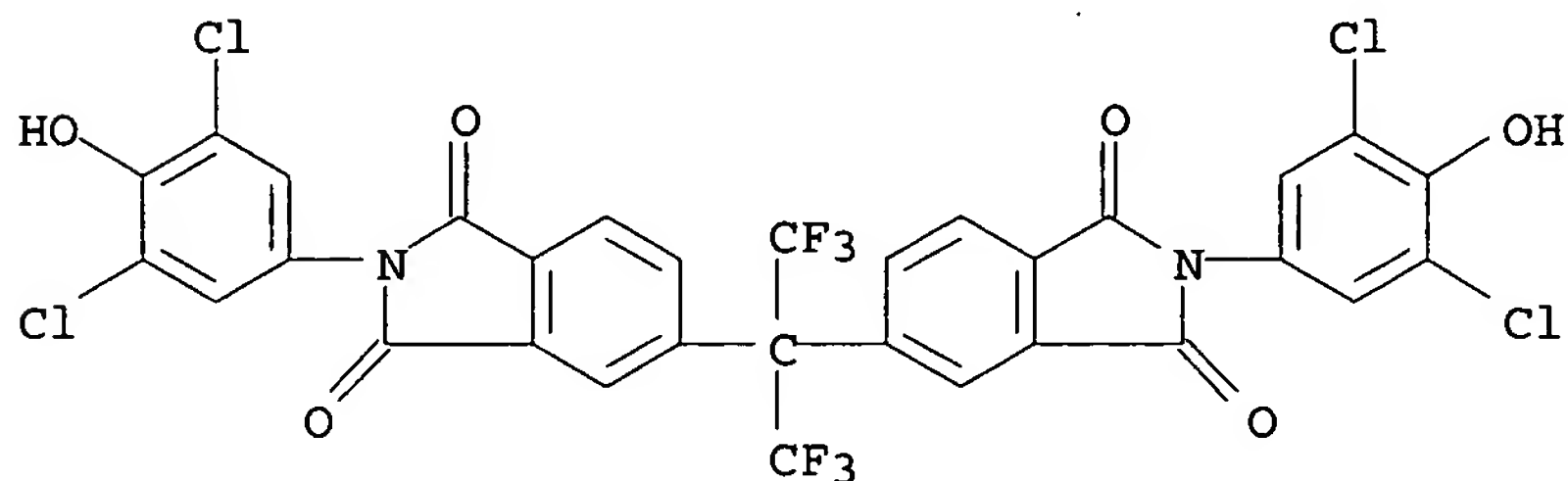
RN 410093-47-9 HCAPLUS

CN 2,6-Naphthalenedicarbonyl dichloride, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile and 5,5'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylidene]bis[2-(3,5-dichloro-4-hydroxyphenyl)-1H-isoindole-1,3(2H)-dione] (9CI) (CA INDEX NAME)

CM 1

CRN 410092-86-3

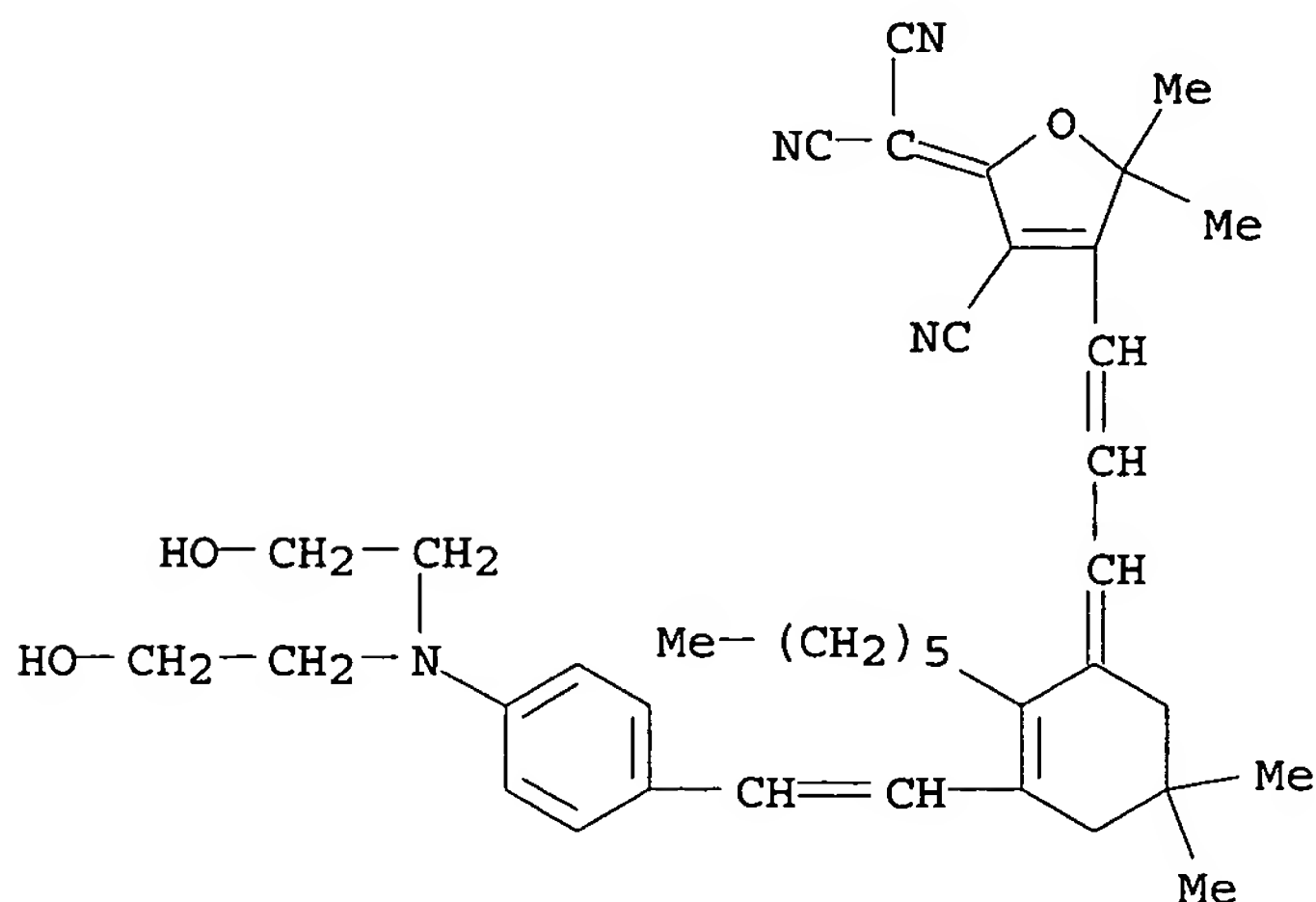
CMF C31 H12 Cl4 F6 N2 O6



CM 2

CRN 259653-88-8

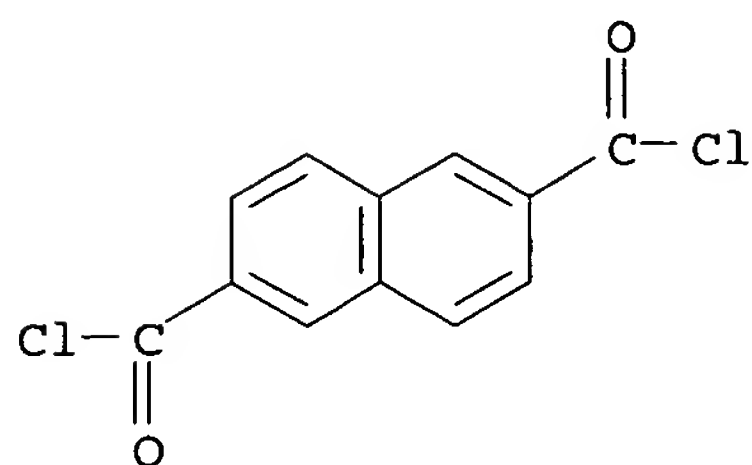
CMF C39 H48 N4 O3



CM 3

CRN 2351-36-2

CMF C12 H6 C12 O2



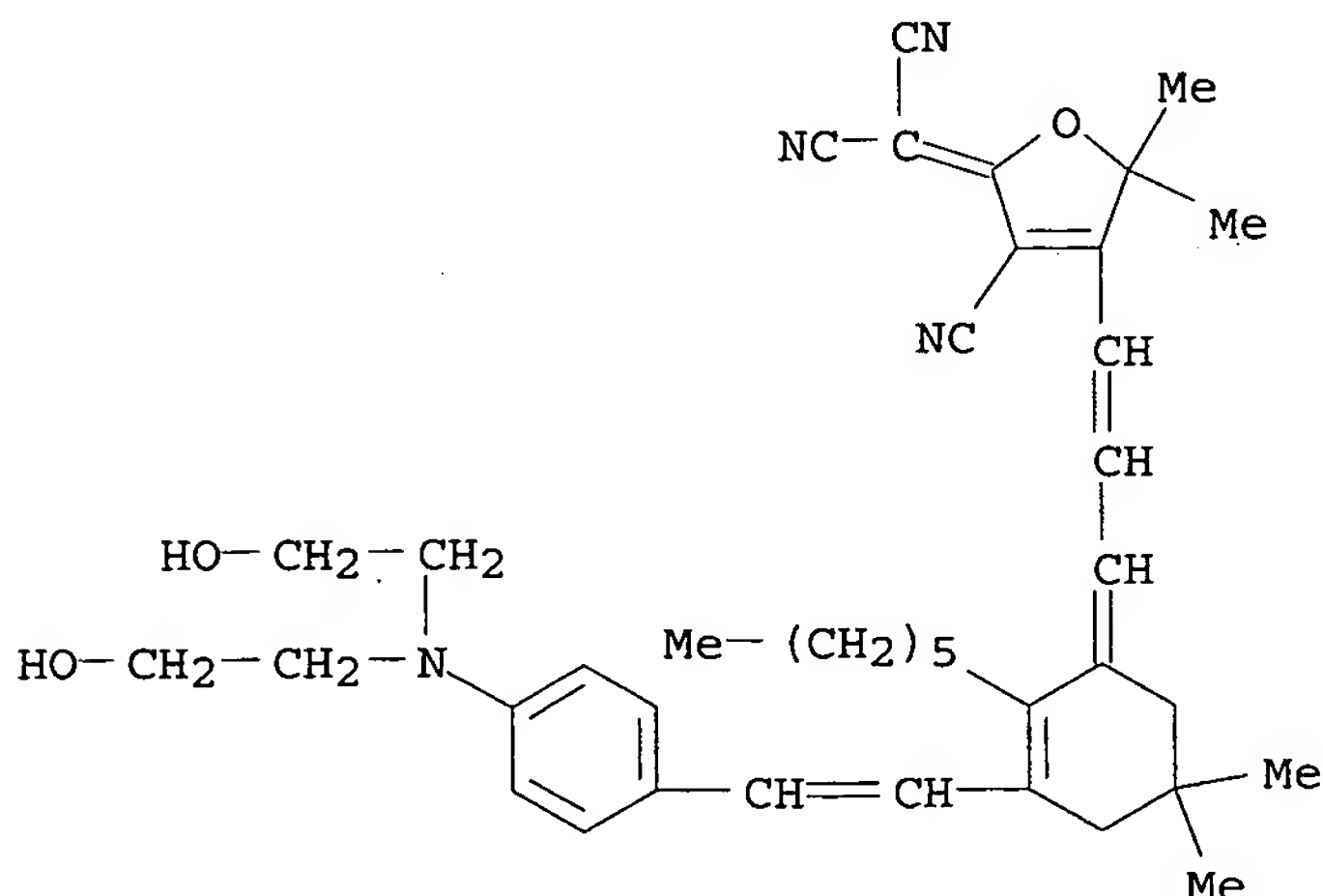
IT 259653-88-8

RL: RCT (Reactant); RACT (Reactant or reagent)

(second-order nonlinear optical devices employing polymers containing polyene-bridged second-order nonlinear optical chromophores)

RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT:

6

THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 69 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:233700 HCAPLUS

DOCUMENT NUMBER: 136:254333

TITLE: Sterically stabilized second-order nonlinear optical chromophores and devices incorporating the same

INVENTOR(S): Dalton, Larry R.; Zhang, Cheng; Wang, Chuanguang; Fetterman, Harold R.; Wang, Fang; Steier, William; Harper, Aaron W.; Ren, Albert S.; Michael, Joseph

PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA

SOURCE: U.S., 30 pp., Cont.-in-part of U.S. 6,067,186.

CODEN: USXXAM  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 10  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6361717	B1	20020326	US 2000-488422	20000120
US 6067186	A	20000523	US 1998-122806	19980727
US 6616865	B1	20030909	US 2000-546930	20000411
US 6348992	B1	20020219	US 2000-551685	20000418
US 6652779	B1	20031125	US 2000-679937	20001005
WO 2001053746	A1	20010726	WO 2001-US1655	20010117
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 2002027220	A1	20020307	US 2001-898625	20010703
US 6555027	B2	20030429		

PRIORITY APPLN. INFO.:  
 US 1998-122806 A2 19980727  
 US 2000-488422 A2 20000120  
 US 2000-546930 A2 20000411  
 US 2000-551685 A2 20000418

OTHER SOURCE(S): MARPAT 136:254333

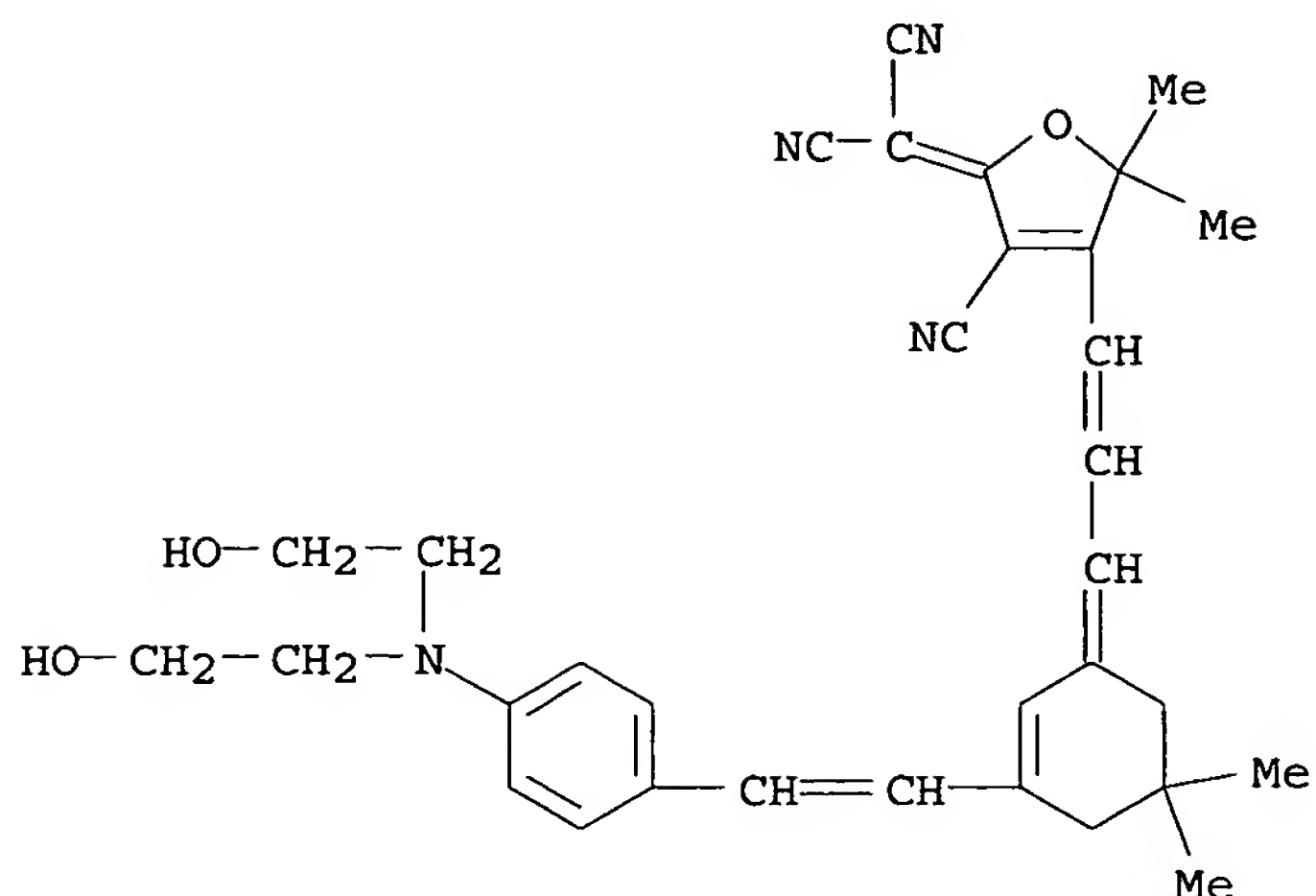
AB Nonlinear optical devices are described in which the active element incorporates a chromophore which includes an electron donor group and an electron acceptor group joined by a bridge structure, preferably a ring-locked bridge structure. Preferably, at least the electron acceptor group is bonded to the bridge structure via a conjugated diene. In a preferred embodiment, the bridge structure also includes  $\geq 1$  bulky side group. The bridge structure may comprise two protected alicyclic rings or ring-locked trienone. Alternately, the chromophore may include an electron donor group, a ring-locked tricyano electron acceptor group, and a bridge structure between them. The electron acceptor group may comprises an isophorone structure. The bridge structure may include a bithiophene unit or a a modified isophorone unit.

IT 224784-30-9 265992-52-7 351444-91-2  
 351444-93-4 351444-95-6 351444-98-9  
 351445-00-6 351445-03-9 351445-05-1  
 351445-08-4 351445-10-8

RL: DEV (Device component use); USES (Uses)  
 (nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

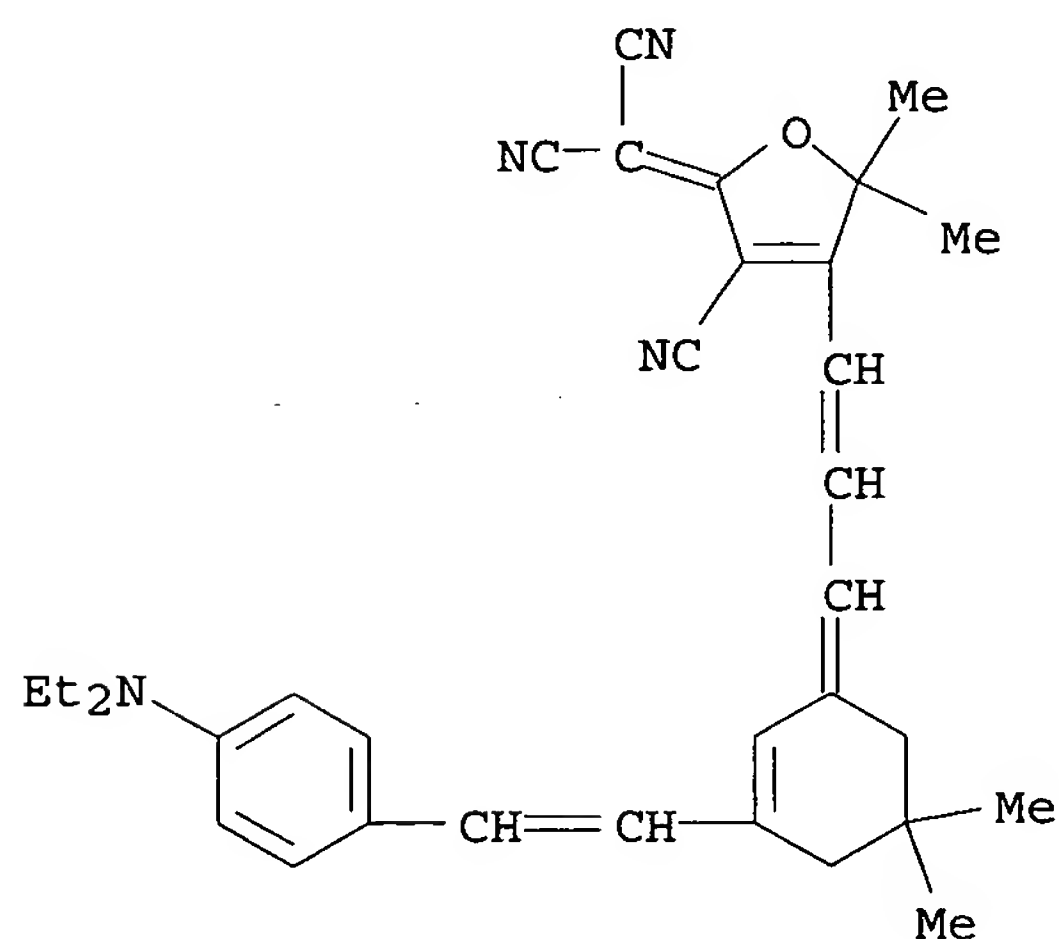
RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene] - (9CI) (CA INDEX NAME)



RN 265992-52-7 HCAPLUS

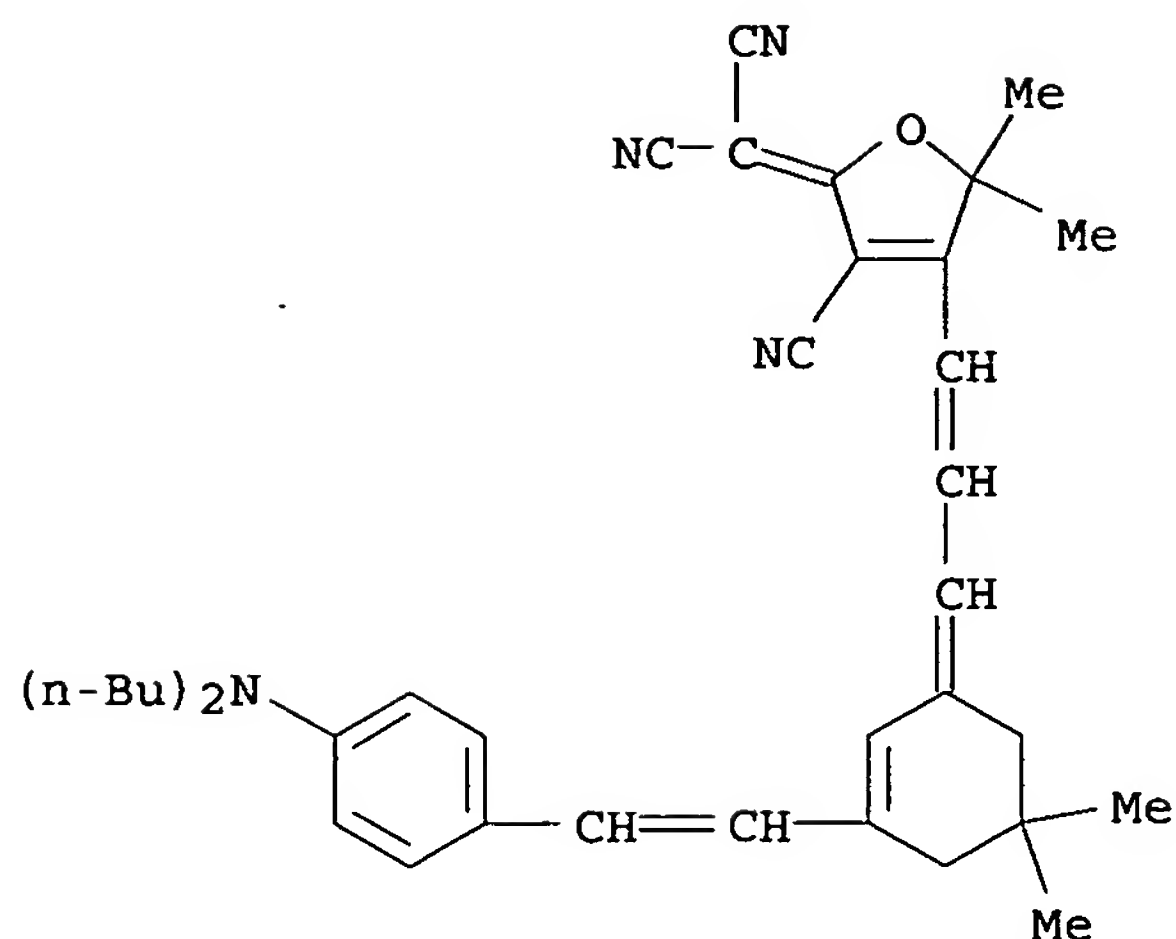
CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 351444-91-2 HCAPLUS

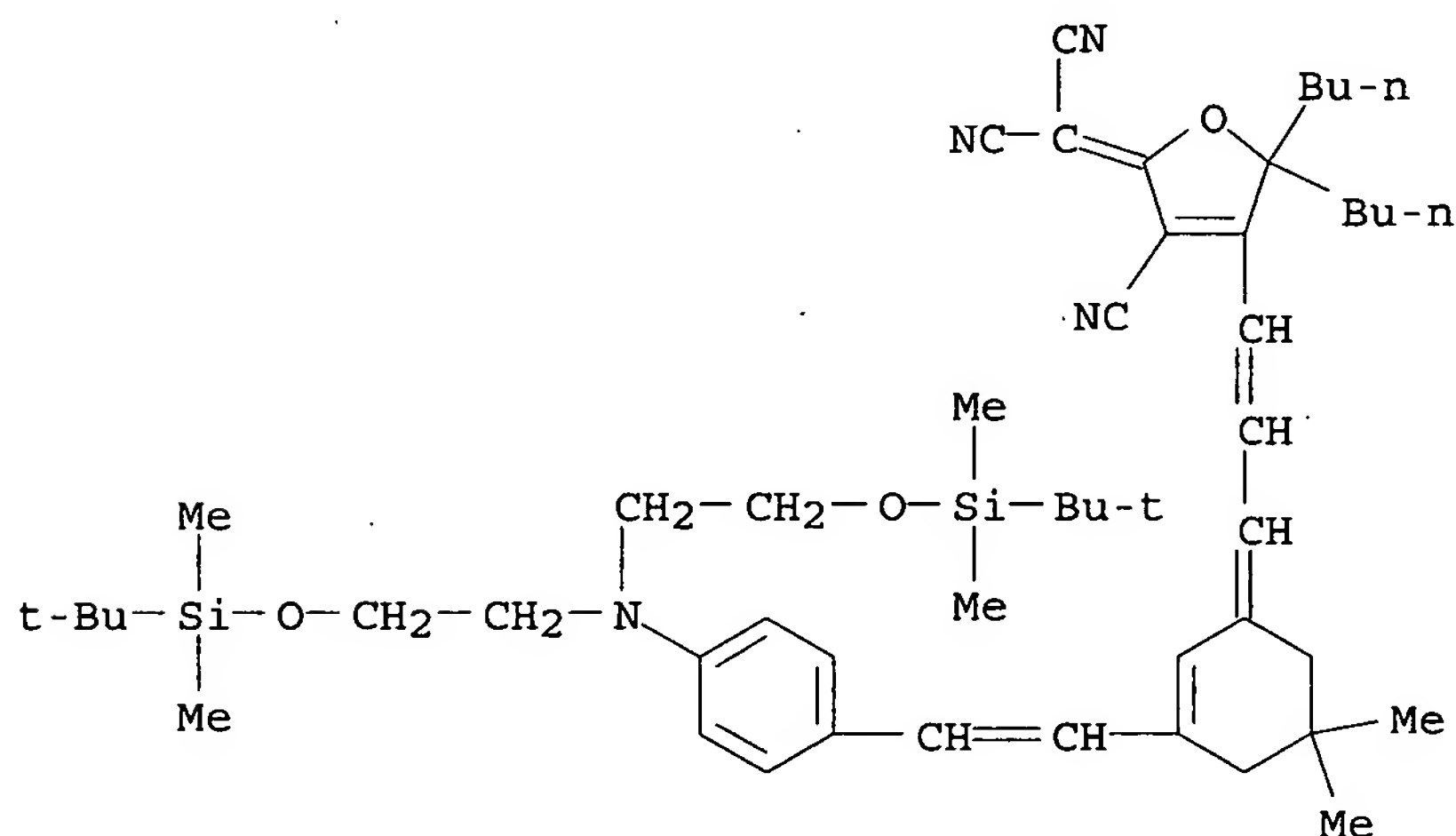
CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)





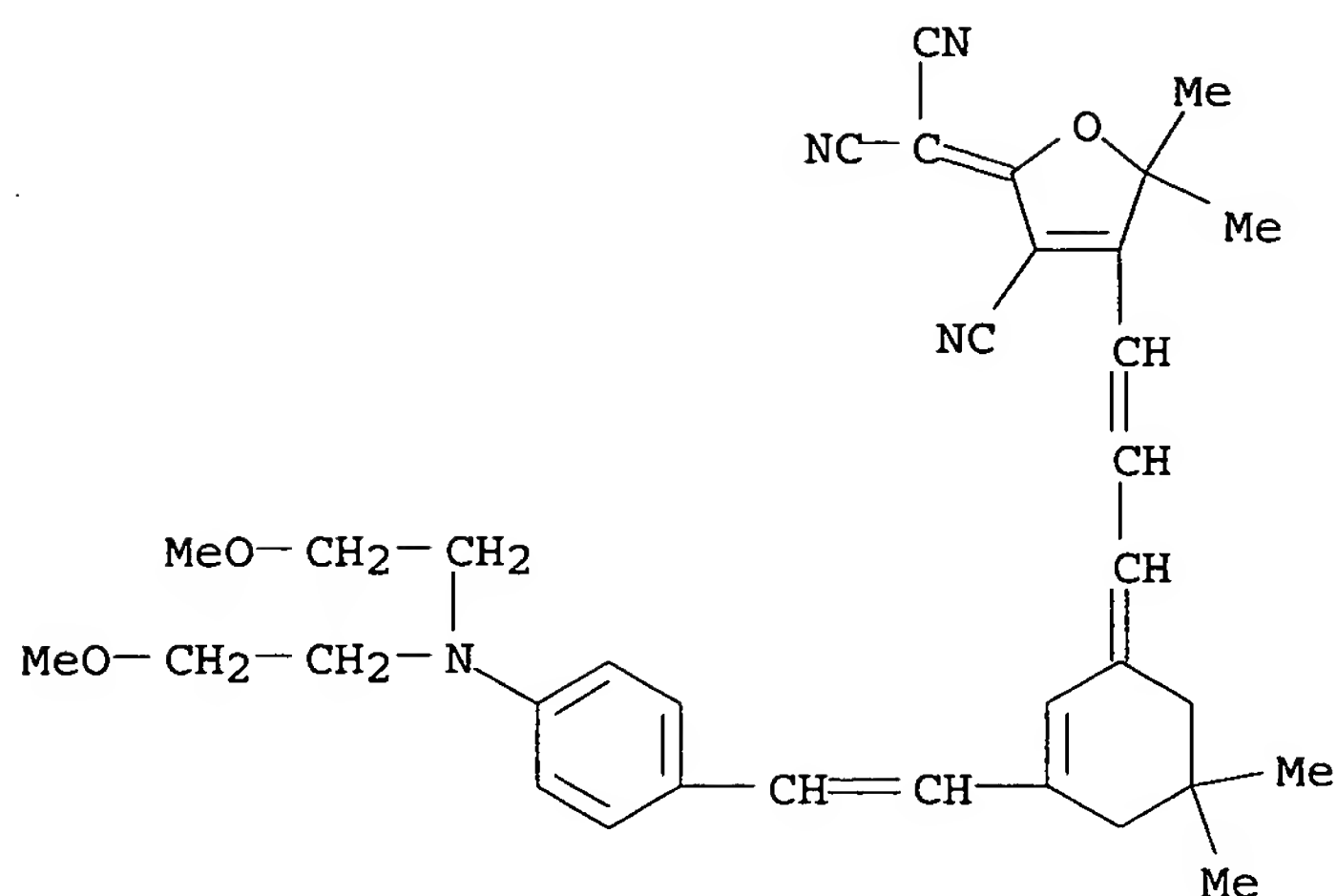
RN 351444-93-4 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



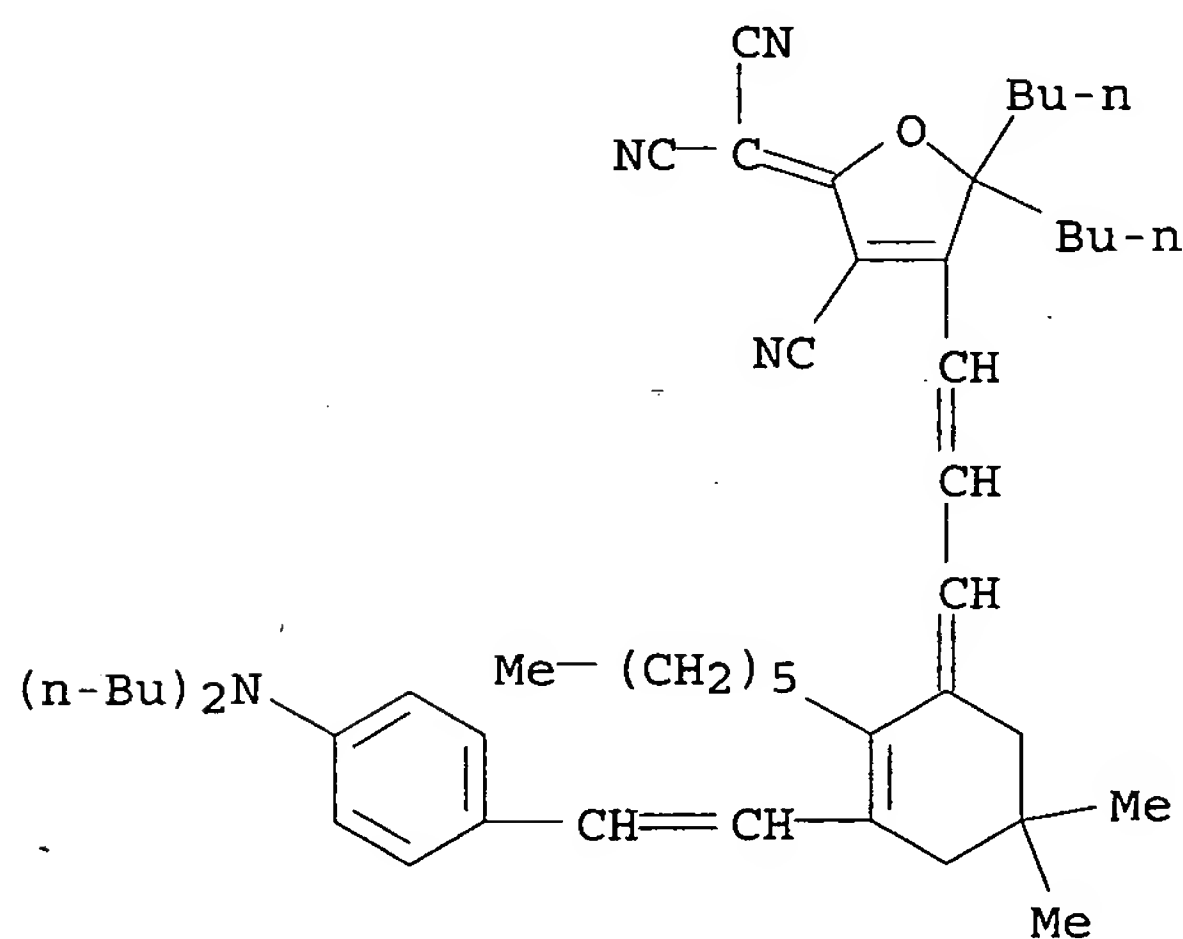
RN 351444-95-6 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



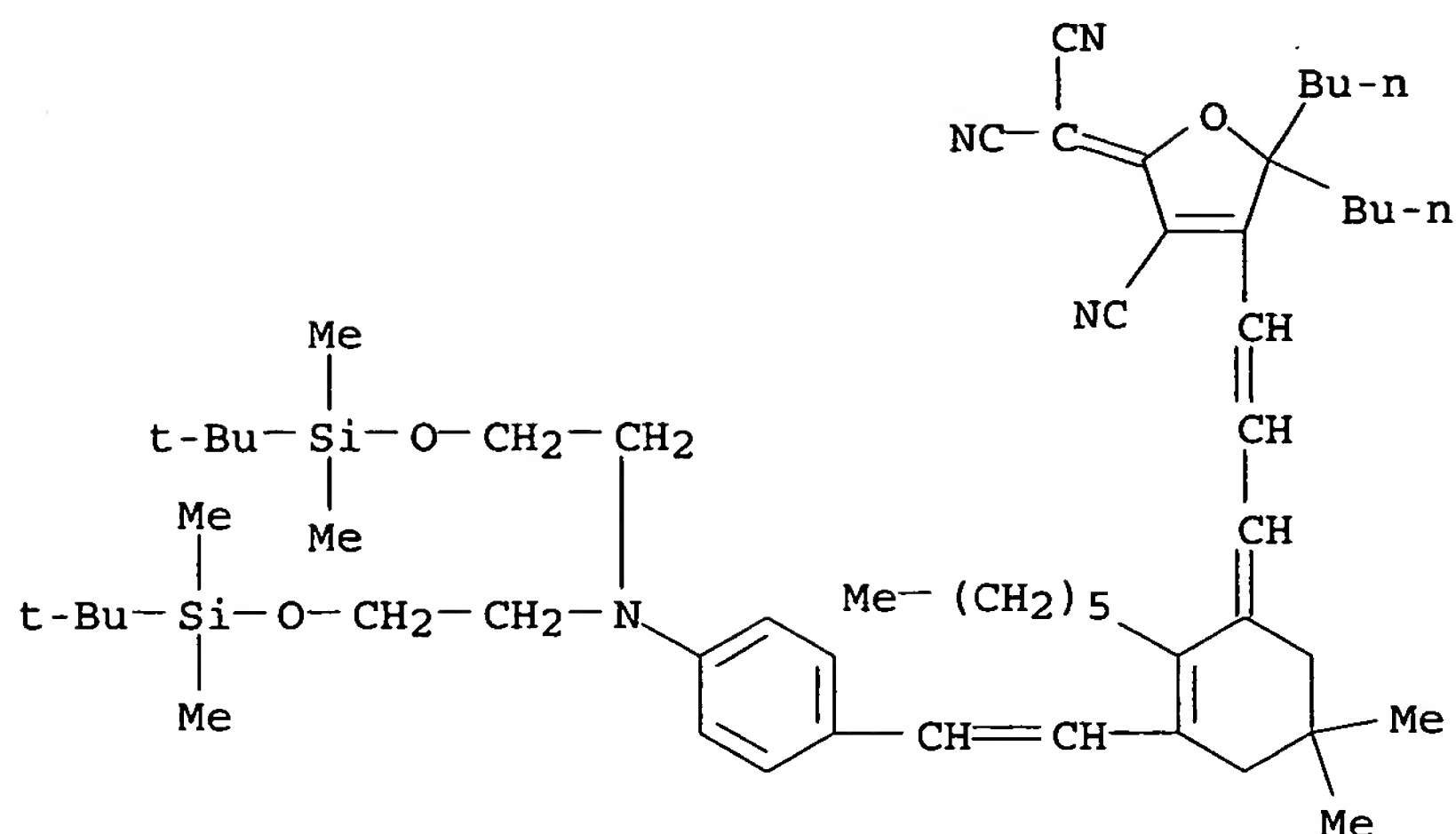
RN 351444-98-9 HCAPLUS

CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[3-[2-[4-(dibutylamino)phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



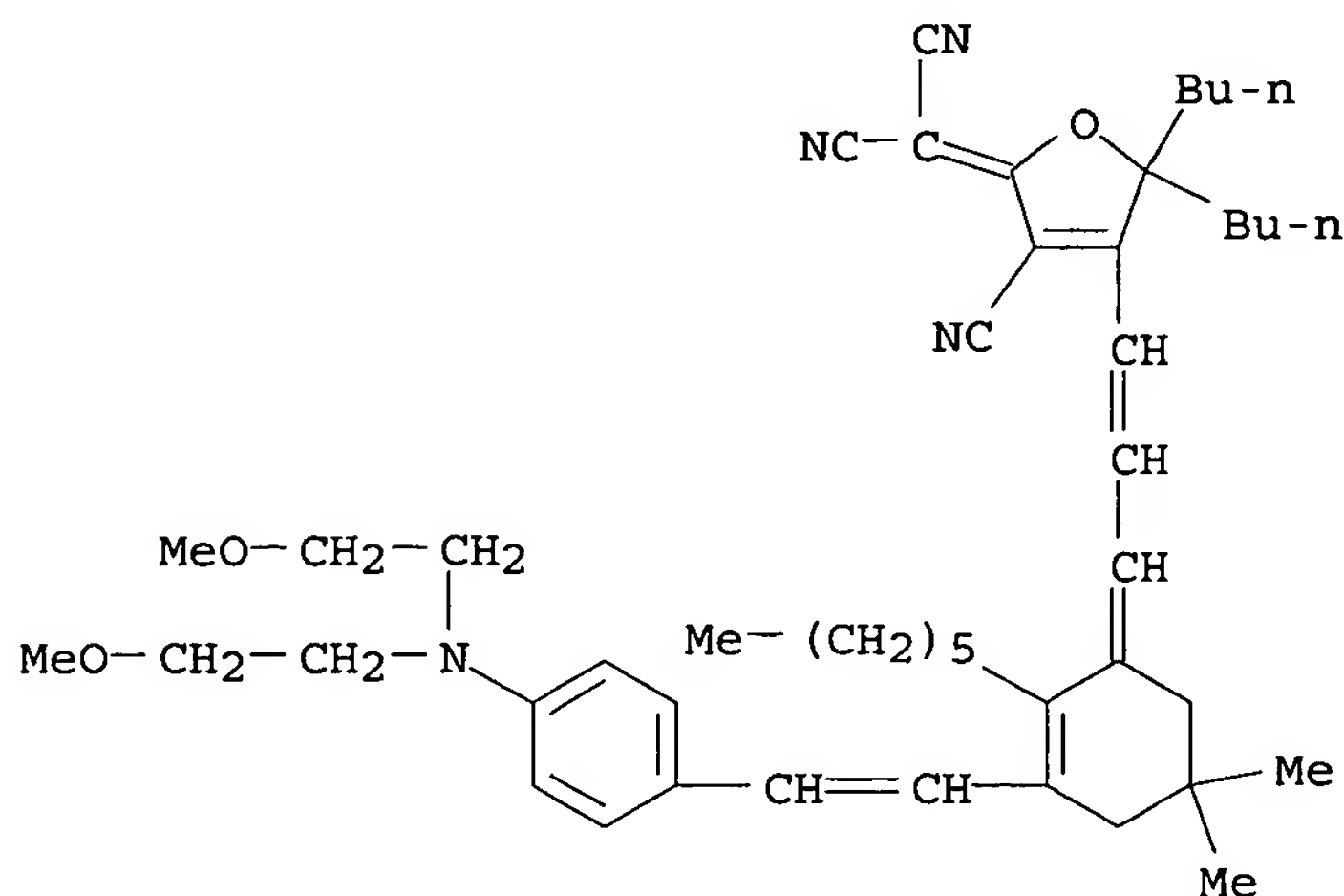
RN 351445-00-6 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl]dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



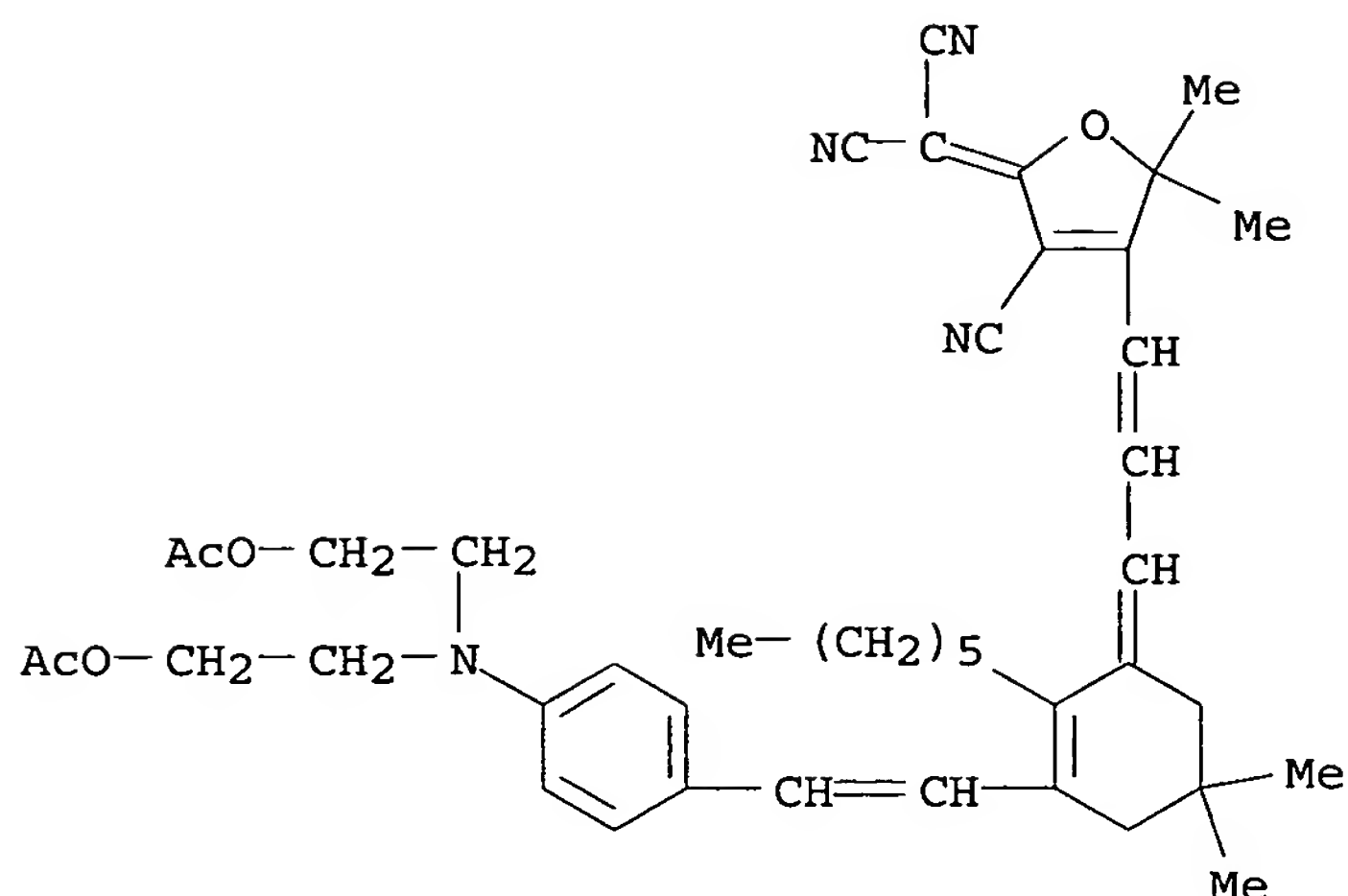
RN 351445-03-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)



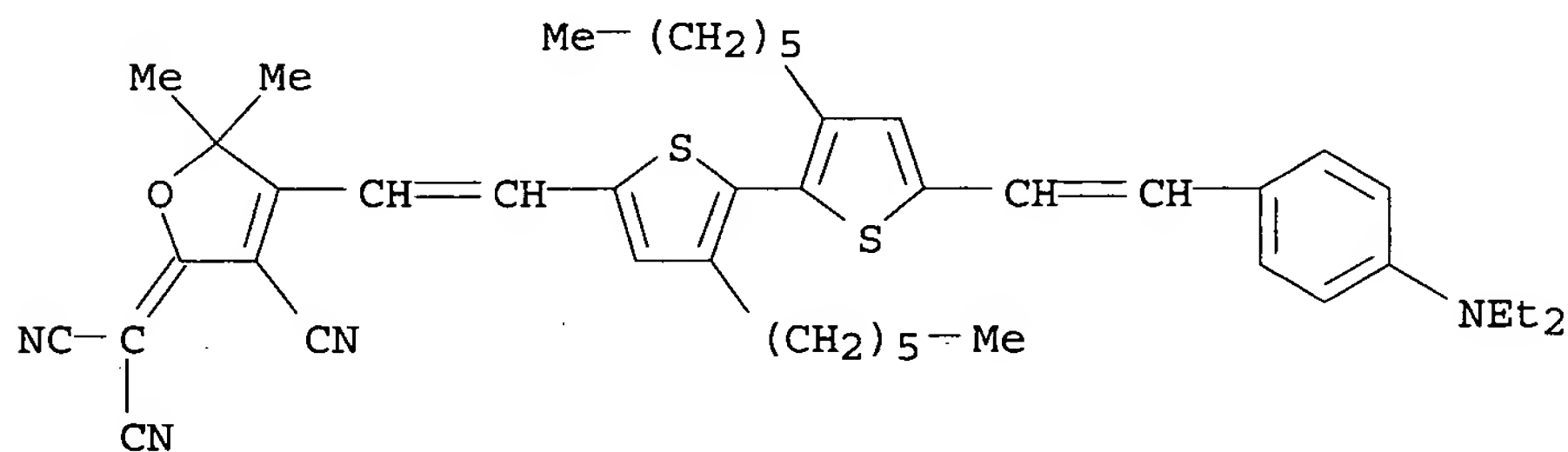
RN 351445-05-1 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)



RN 351445-08-4 HCAPLUS

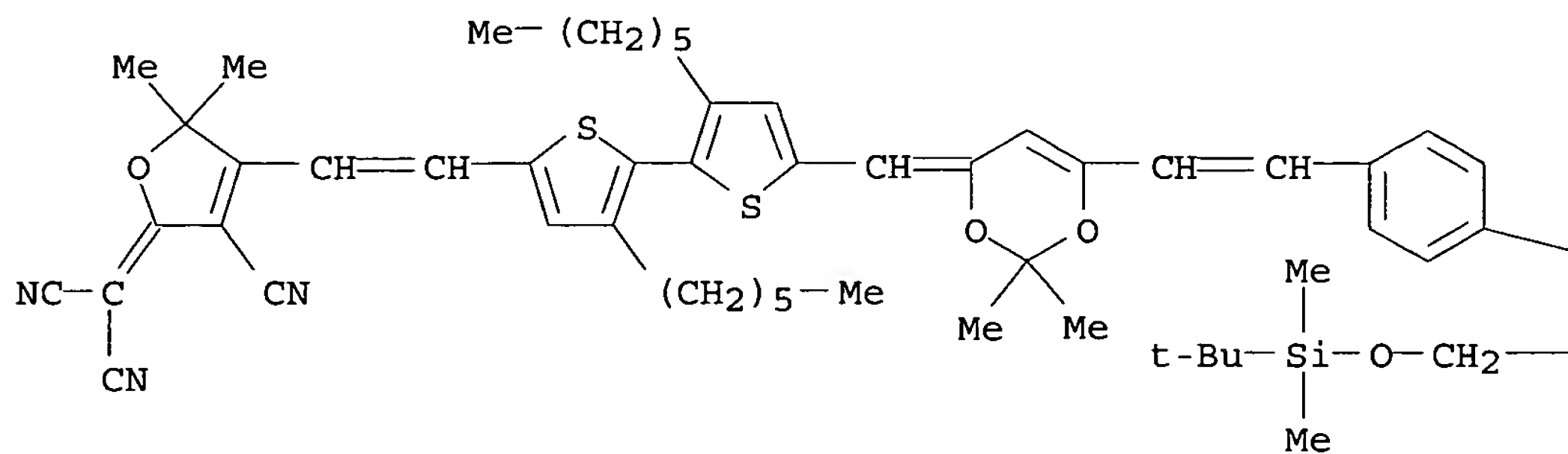
CN Propanedinitrile, [3-cyano-4-[2-[5'-[2-[4-(diethylamino)phenyl]ethenyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



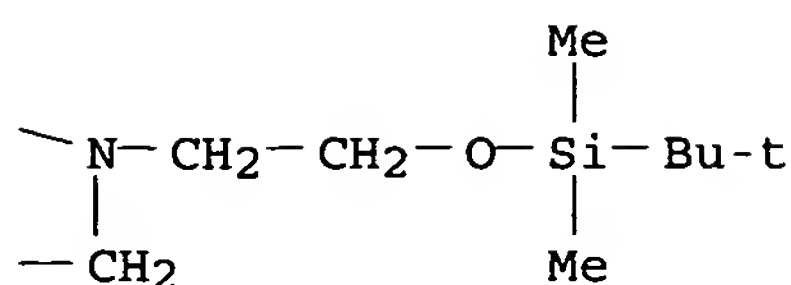
RN 351445-10-8 HCAPLUS

CN Propanedinitrile, [4-[2-[5'-[[6-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2,2-dimethyl-4H-1,3-dioxin-4-ylidene]methyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B

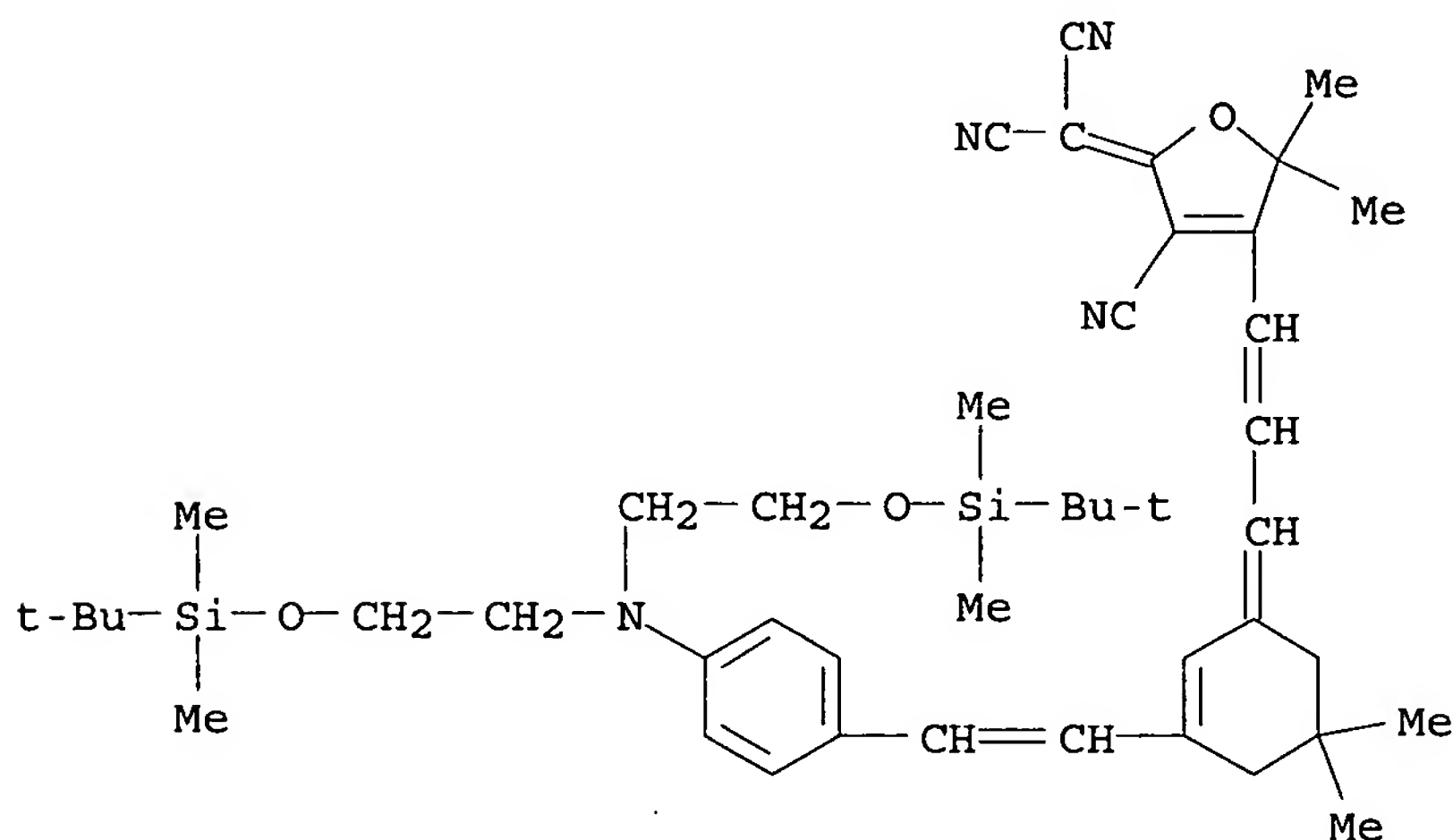


IT 266348-41-8P

RL: DEV (Device component use); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses) (nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyloxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

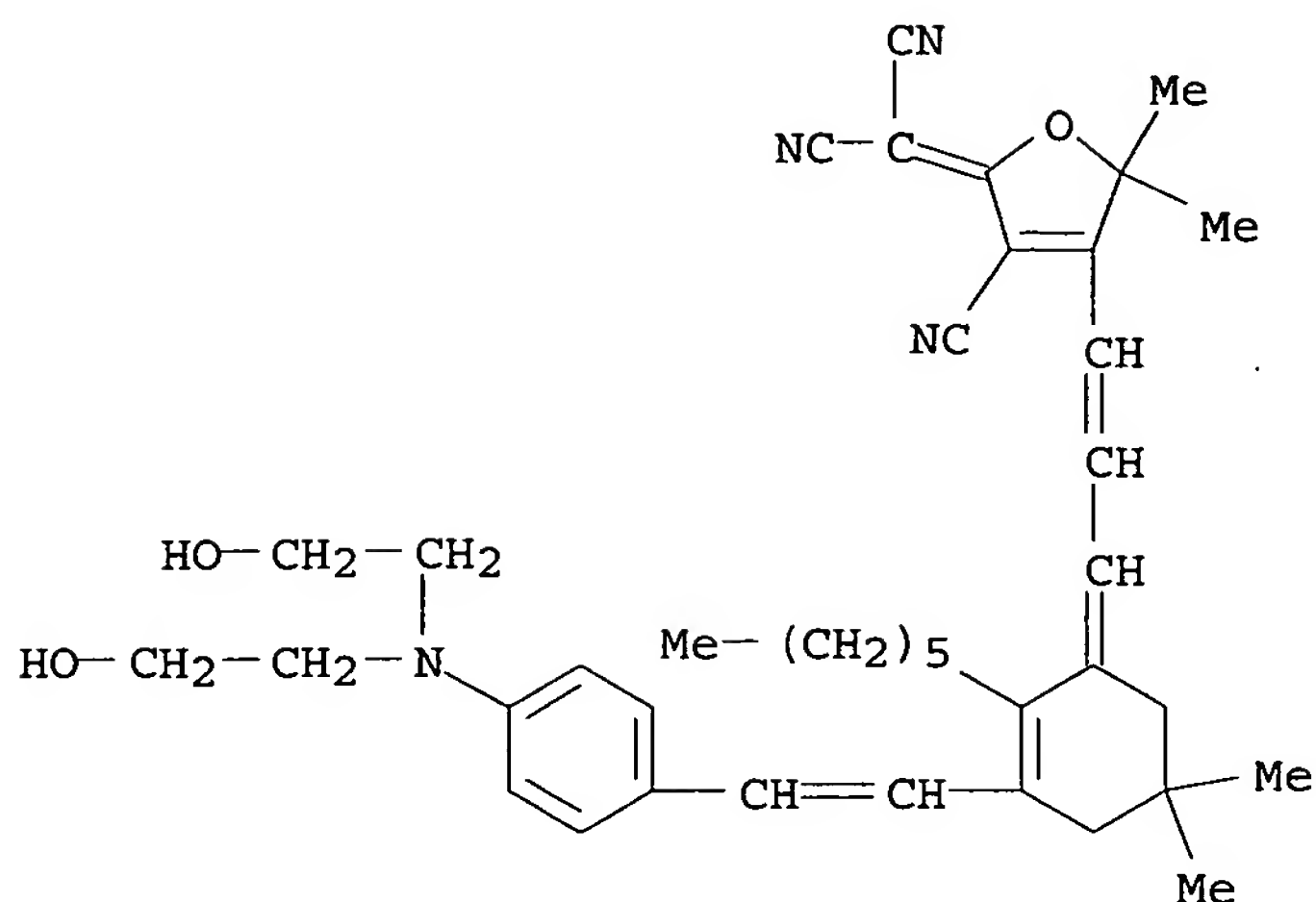


IT 259653-88-8P 351444-88-7P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses) (nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



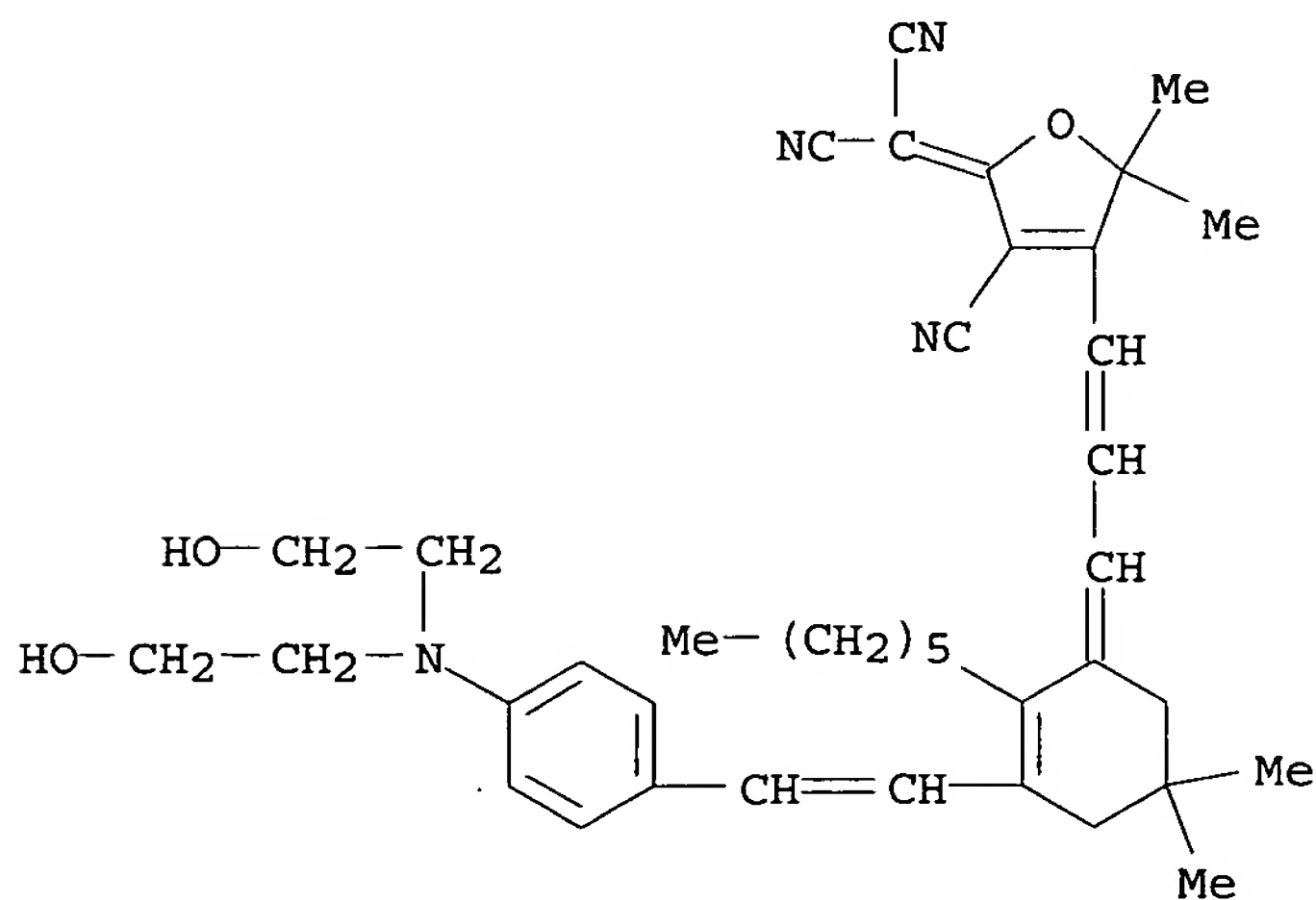
RN 351444-88-7 HCAPLUS

CN 1,4-Benzenedicarbonyl dichloride, polymer with '[4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile and 4,4'-(1-methylethylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

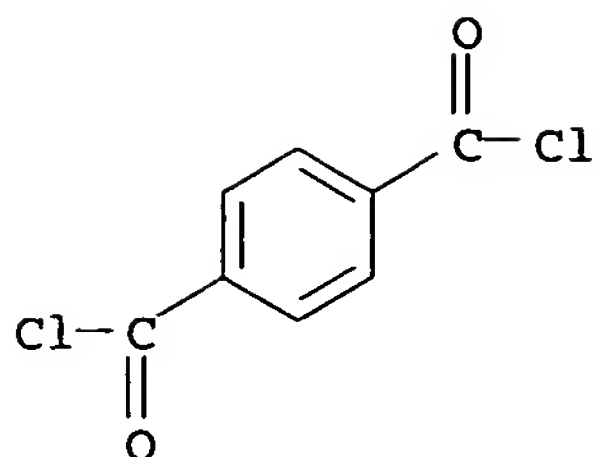
CMF C39 H48 N4 O3



CM 2

CRN 100-20-9

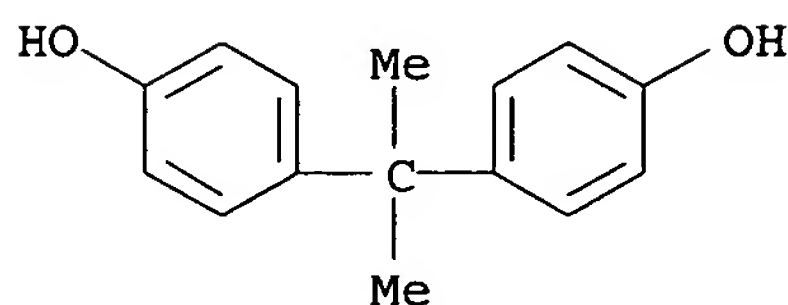
CMF C8 H4 Cl2 O2



CM 3

CRN 80-05-7

CMF C15 H16 O2



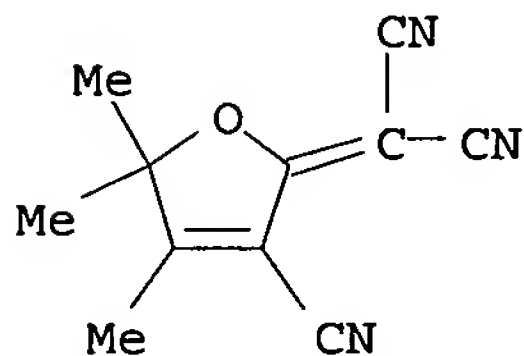
IT 171082-32-9, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran

RL: RCT (Reactant); RACT (Reactant or reagent)

(nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT:

50

THERE ARE 50 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 70 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:196023 HCAPLUS

DOCUMENT NUMBER: 136:392861

TITLE: Monolithic photorefractive organic glasses with large coupling gain and strong beam fanning

AUTHOR(S): Gubler, Ulrich; He, Meng; Wright, Daniel; Roh, Yeonsuk; Twieg, Robert; Moerner, W. E.

CORPORATE SOURCE: Department of Chemistry, Stanford University, Stanford, CA, 94305-5080, USA

SOURCE: Advanced Materials (Weinheim, Germany) (2002), 14(4), 313-317

CODEN: ADVMEW; ISSN: 0935-9648

PUBLISHER: Wiley-VCH Verlag GmbH

DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB Two-wave mixing expts. in a standard geometry were conducted to characterize the photorefractive performance of the nonlinear optical chromophore 2-dicyanomethylene-3-cyano-5,5-dimethyl-4-(4'-dihexylaminophenyl)-2,5-dihydrofuran (DCDHF-6) samples. Large photorefractive gain coeffs. ( $\Gamma > 100/\text{cm}$ ) were achieved at the moderate field strength of 20-25 V/ $\mu\text{m}$ . Net gain was reached at 5 V/ $\mu\text{m}$ , which enabled low voltage operation with this type of material. The DCDHF-6 chromophore could form an amorphous organic glass by itself. When a melted sample was cooled fast enough (10-20  $^{\circ}/\text{min}$ ), the chromophore formed a stable glass with a glass transition temperature of  $\approx 19^{\circ}$ . As the absorption of DCDHF-6 at the laser wavelength of 647 nm was negligible, all samples for the optical measurements were doped with 0.5% C60, giving an absorption coefficient of 10/cm. In addition to the pure DCDHF-6/C60 samples, samples

with

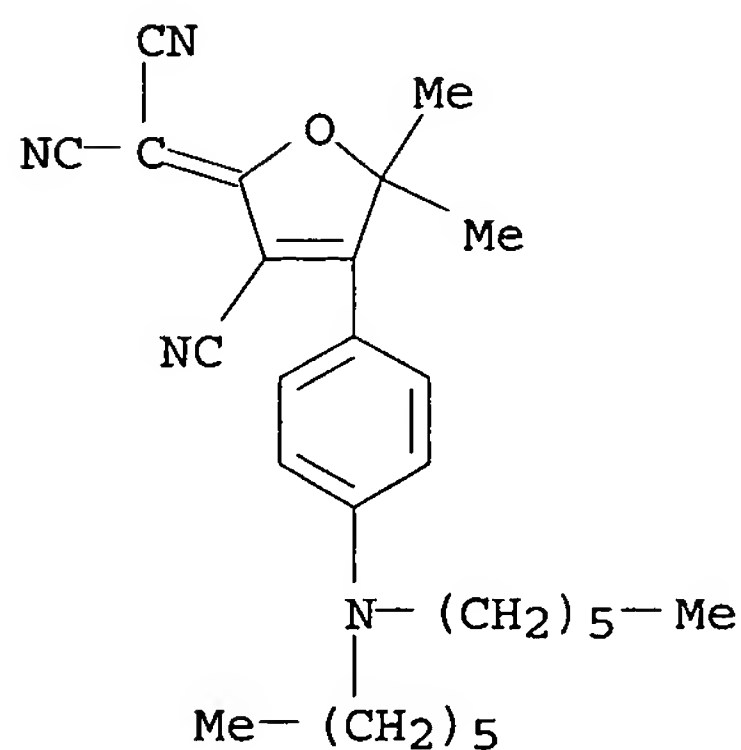
10% of the polymers poly(n-vinylcarbazole) (PVK) and poly(methylmethacrylate) (PMMA) were also prepared to improve the speed. Similar to ellipsometry measurements, the gain coeffs. of pure DCDHF-6/C60 were the same as for DCDHF-6/PVK/C60 with a slight reduction for the DCDHF-6/PMMA/C60, indicating that the space charge field was similar in all composites. Strong beam fanning was observed with suppression of the initial beam to 25% of its initial value in samples 100  $\mu\text{m}$  thick.

IT 402490-54-4

RL: OCU (Occurrence, unclassified); PRP (Properties); OCCU (Occurrence) (DCDHF-6; monolithic photorefractive organic glasses with large coupling gain and strong beam fanning)

RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



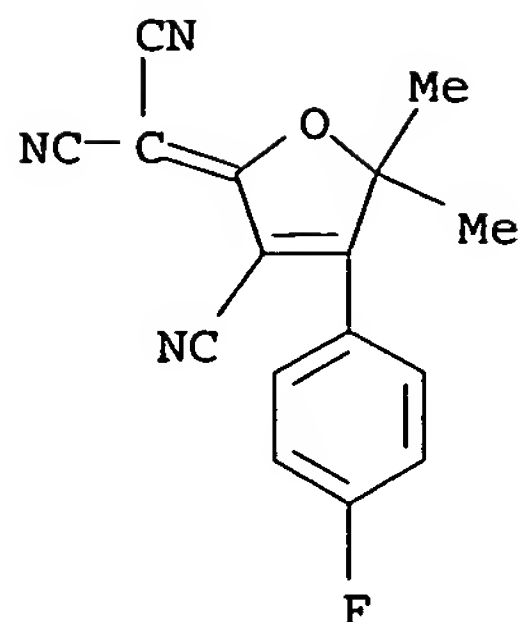
IT 425604-51-9P

RL: PNU (Preparation, unclassified); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent) (monolithic photorefractive organic glasses with large coupling gain and strong beam fanning prepared from)

RN 425604-51-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-(4-fluorophenyl)-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)





REFERENCE COUNT: 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 71 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:172353 HCAPLUS

DOCUMENT NUMBER: 136:238802

TITLE: Second-order nonlinear optical chromophores containing dioxine and/or bithiophene as conjugate bridge and devices incorporating the same

INVENTOR(S): Wang, Chuanguang; Zhang, Cheng; Fetterman, Harold R.; Steier, William; Michael, Joseph

PATENT ASSIGNEE(S): USA

SOURCE: U.S. Pat. Appl. Publ., 16 pp., Cont.-in-part of U. S. Ser. No. 488,422.

CODEN: USXXCO

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 10

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002027220	A1	20020307	US 2001-898625	20010703
US 6555027	B2	20030429		
US 6067186	A	20000523	US 1998-122806	19980727
US 6361717	B1	20020326	US 2000-488422	20000120
US 6616865	B1	20030909	US 2000-546930	20000411
US 6348992	B1	20020219	US 2000-551685	20000418
WO 2003005120	A1	20030116	WO 2002-US20894	20020701
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				

PRIORITY APPLN. INFO.: US 1998-122806 A2 19980727  
 US 2000-488422 A2 20000120  
 US 2000-546930 A2 20000411  
 US 2000-551685 A2 20000418  
 US 2001-898625 A 20010703

OTHER SOURCE(S): MARPAT 136:238802  
 GI

\* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT \*

AB Nonlinear optical devices (e.g., electrooptical modulators, phase shifters) comprising an active element formed from a chromophore including an electron donor group, an electron acceptor group, and a bridge structure between the electron donor group and the electron acceptor group are described in which the chromophores is described by the general formula I, the bridge structure is described by the general formula II, or the electron donor group and the bridge structure are described by the general formula III (A = CH<sub>2</sub> or O; B = is an electron acceptor; and R = independently selected H, F, or a perhalogenated, halogenated, or nonhalogenated C1-30 aliphatic or aromatic group functionalized with ≥0 hydroxy, ether, ester, amino, silyl, and siloxy groups).

IT 402857-27-6 402857-28-7

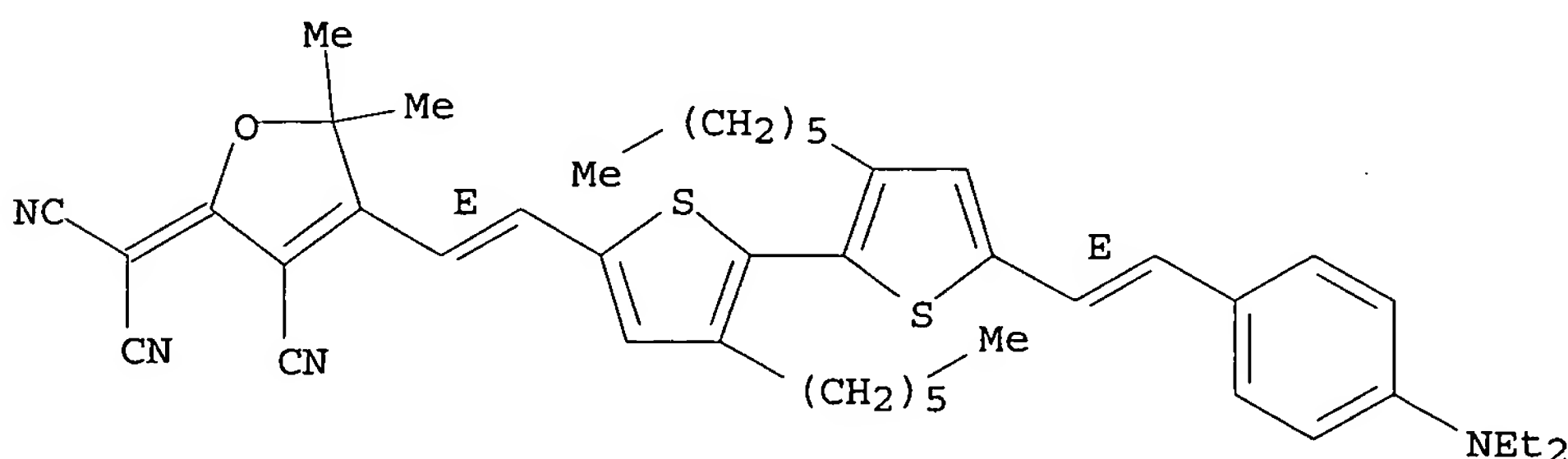
RL: DEV (Device component use); USES (Uses)

(nonlinear optical devices employing second-order nonlinear optical chromophores containing dioxine and/or bithiophene as conjugate bridge)

RN 402857-27-6 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5'-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

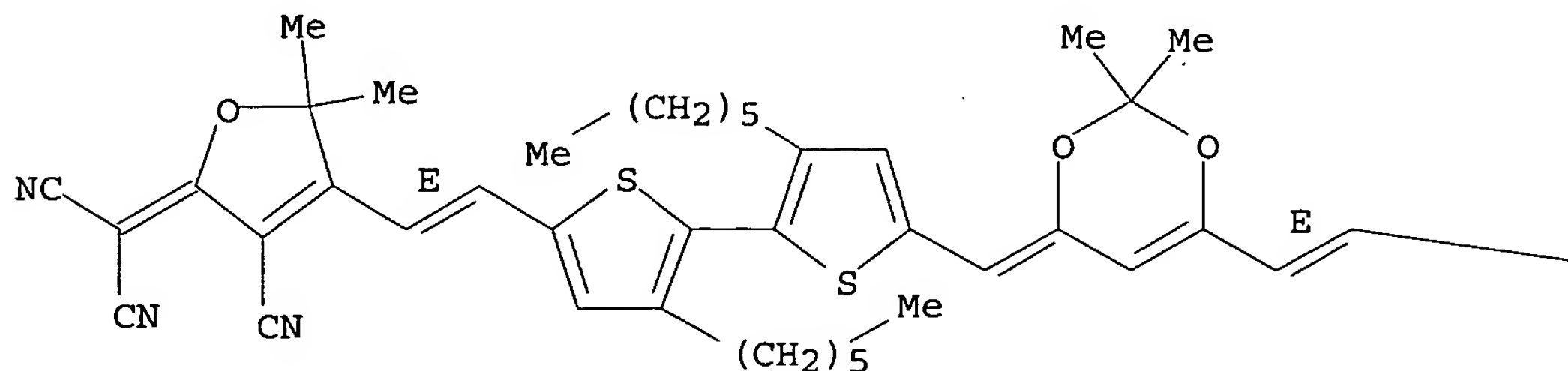


RN 402857-28-7 HCAPLUS

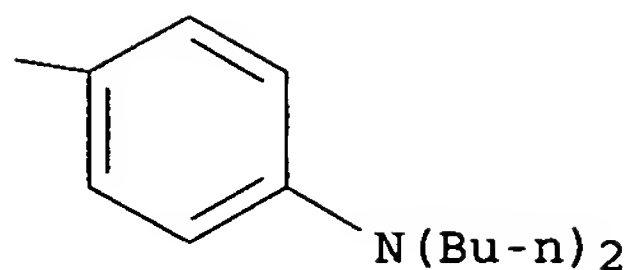
CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5'-[[6-[(1E)-2-[4-(dibutylamino)phenyl]ethenyl]-2,2-dimethyl-4H-1,3-dioxin-4-ylidene]methyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as described by E or Z.

PAGE 1-A



PAGE 1-B



IT 402857-26-5P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

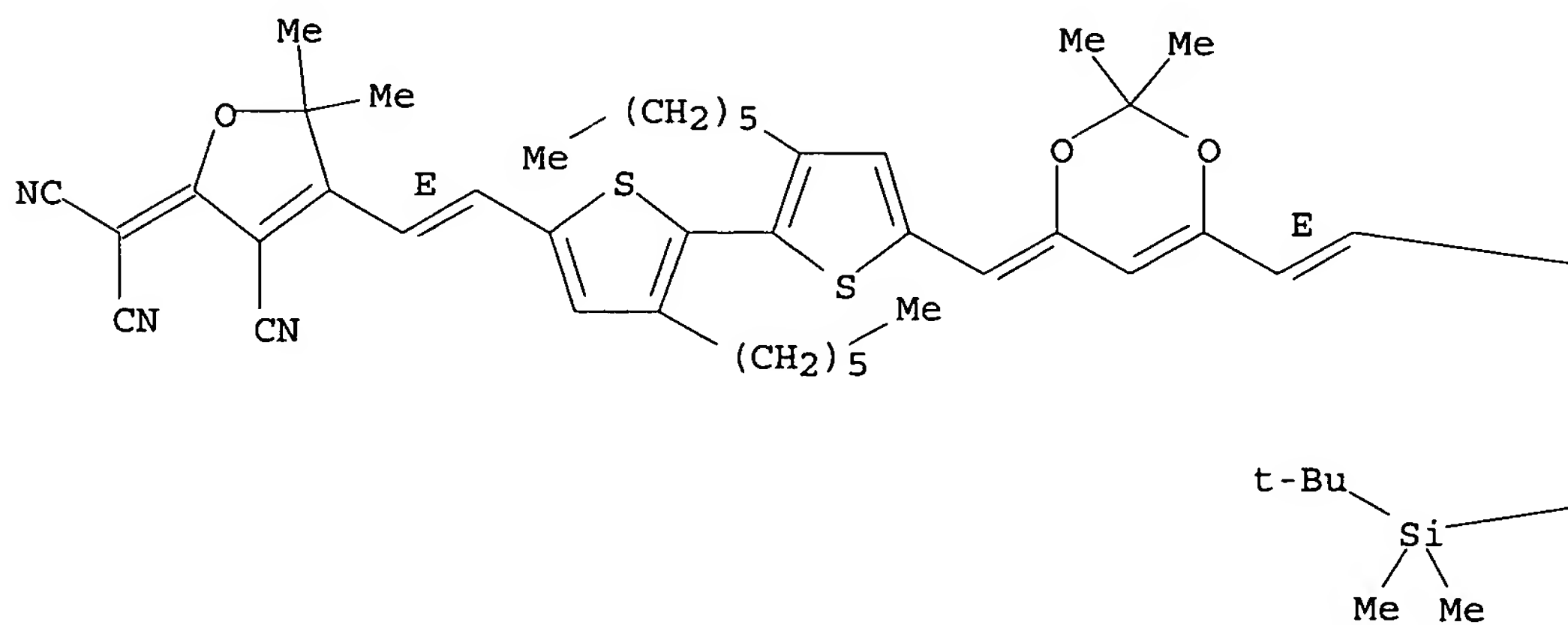
(nonlinear optical devices employing second-order nonlinear optical chromophores containing dioxine and/or bithiophene as conjugate bridge)

RN 402857-26-5 HCAPLUS

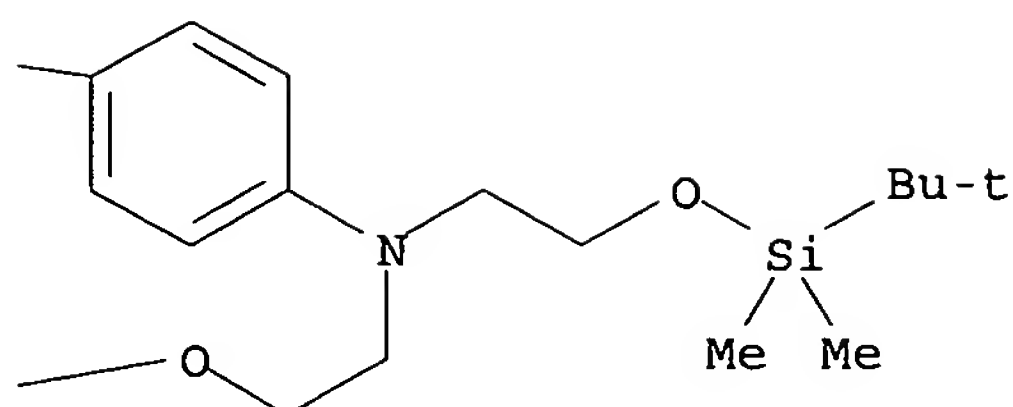
CN Propanedinitrile, [4-[(1E)-2-[5'-[[6-[(1E)-2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2,2-dimethyl-4H-1,3-dioxin-4-ylidene]methyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as described by E or Z.

PAGE 1-A



PAGE 1-B



L8 ANSWER 72 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:142698 HCAPLUS

DOCUMENT NUMBER: 136:223941

TITLE: Design and synthesis of advanced NLO materials for electro-optic applications

INVENTOR(S): Londergan, Tim; Todorova, Galina K.; Zhu, Jingsong; Huang, Diyun

PATENT ASSIGNEE(S): Lumera Corporation, USA

SOURCE: PCT Int. Appl., 119 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 5

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002014305	A2	20020221	WO 2001-US25779	20010817
WO 2002014305	A3	20021024		
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG			
CA 2419820	AA	20020221	CA 2001-2419820	20010817
AU 2001086527	A5	20020225	AU 2001-86527	20010817
EP 1313729	A2	20030528	EP 2001-965981	20010817
R:	AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR			
JP 2004506630	T2	20040304	JP 2002-519445	20010817
PRIORITY APPLN. INFO.:			US 2000-226267P	P 20000817
			WO 2001-US25779	W 20010817
OTHER SOURCE(S):	MARPAT 136:223941			
GI				

\* STRUCTURE DIAGRAM TOO LARGE FOR DISPLAY - AVAILABLE VIA OFFLINE PRINT \*

AB Thiophene-containing chromophores are described by the general formulas I, II and III (D = electron donating group with low electron affinity relative to the electron affinity of A;  $\pi_{1,2}$  are absent or a bridge that provides electronic conjugation between the thiophene ring and D or A, resp.; A = electron accepting group with high electron affinity relative to the electron affinity of D; X = O or S; R = alkyl, aryl, heteroalkyl or heteroaryl; n = 1-4; R<sub>1,2</sub> = alkyl, aryl or heteroalkyl;  $\pi$  is absent or a bridge that provides electronic conjugation between D<sub>1</sub> and the double bond adjacent to  $\pi$ ; D<sub>1</sub> = is an electron donating group with low electron affinity relative to the electron affinity of the fragment to which  $\pi$  is connected). Also described are processes for providing materials comprising the novel chromophores and polymer matrixes containing the novel chromophores. Electrooptical devices containing one or more of the described electron acceptors, electron donors, conjugated bridges, or chromophores are also discussed.

IT 400760-64-7P 400760-71-6P 400771-39-3P

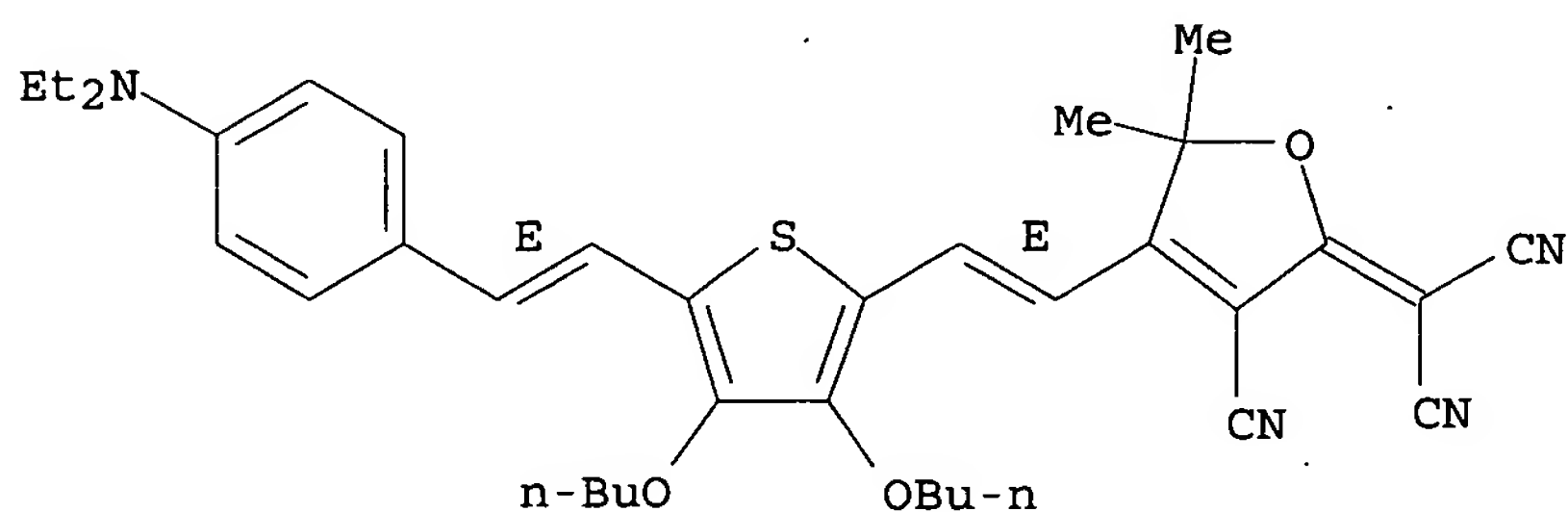
RL: SPN (Synthetic preparation); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(design and synthesis of advanced nonlinear optical materials for electrooptical applications)

RN 400760-64-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[3,4-dibutoxy-5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

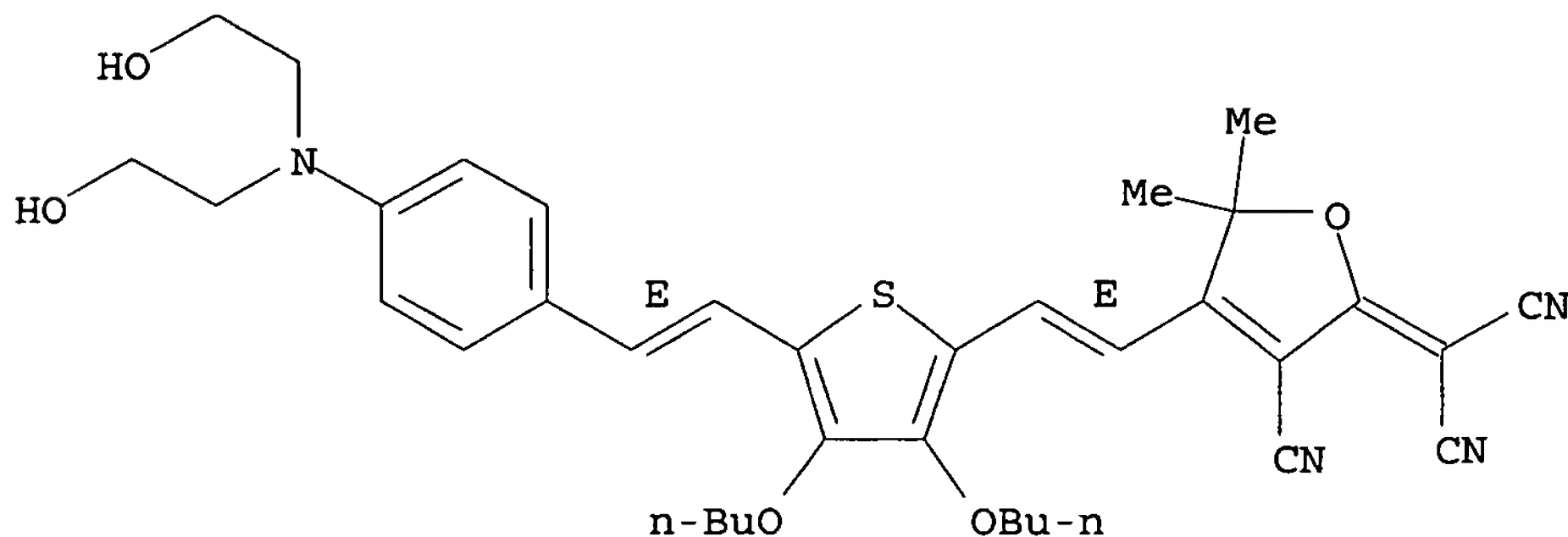
Double bond geometry as shown.



RN 400760-71-6 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutoxy-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

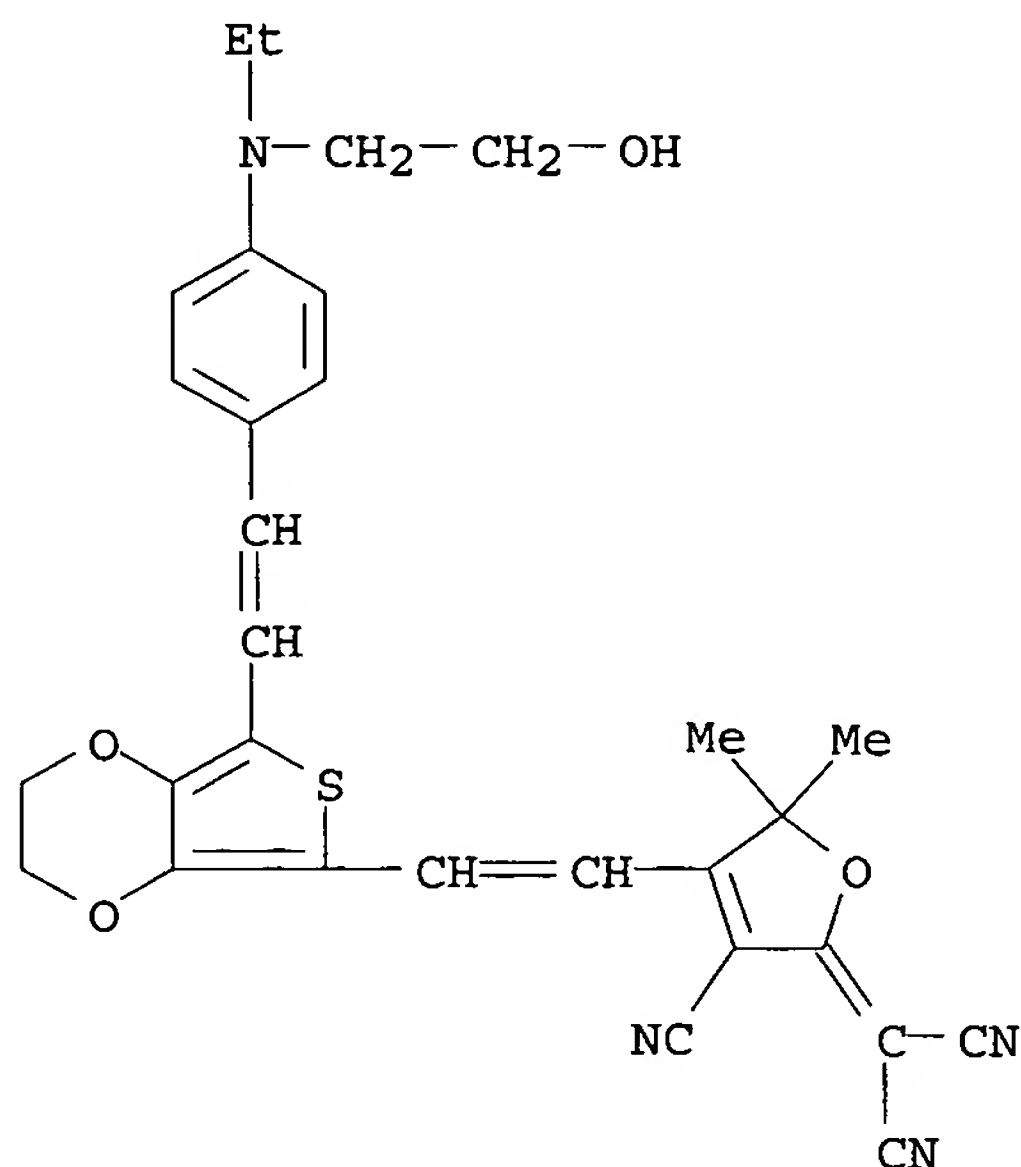
Double bond geometry as shown.



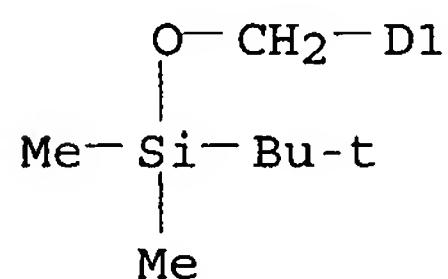
RN 400771-39-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-7-[(1E)-2-[4-[ethyl(2-hydroxyethyl)amino]phenyl]ethenyl]-2,3-dihydrothieno[3,4-b]-1,4-dioxin-5-yl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 2-A



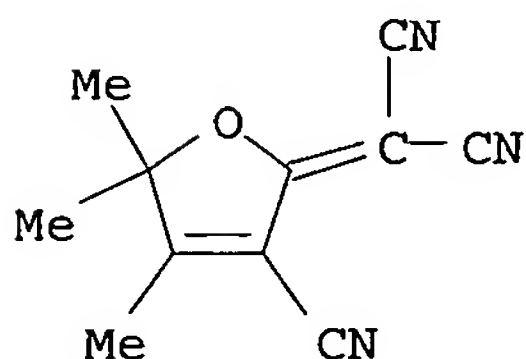
IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(synthesis of advanced nonlinear optical materials using)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



L8 ANSWER 73 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:136097 HCAPLUS

DOCUMENT NUMBER: 136:191442

TITLE: Sterically stabilized polyene-bridged second-order nonlinear optical chromophores and devices incorporating the same

INVENTOR(S): Zhang, Cheng; Fetterman, Harold R.; Steier, William; Michael, Joseph

PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA

SOURCE: U.S., 33 pp., Cont.-in-part of U.S. Ser. No. 546,930. CODEN: USXXAM

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 10

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 6348992	B1	20020219	US 2000-551685	20000418
US 6067186	A	20000523	US 1998-122806	19980727
US 6361717	B1	20020326	US 2000-488422	20000120
US 6616865	B1	20030909	US 2000-546930	20000411
US 6652779	B1	20031125	US 2000-679937	20001005
WO 2001079750	A1	20011025	WO 2001-US12354	20010416
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 2002027220	A1	20020307	US 2001-898625	20010703
US 6555027	B2	20030429		

PRIORITY APPLN. INFO.: US 1998-122806 A2 19980727  
US 2000-488422 A2 20000120  
US 2000-546930 A2 20000411  
US 2000-551685 A2 20000418

OTHER SOURCE(S): MARPAT 136:191442

AB Nonlinear optical devices (e.g., electrooptical modulators, phase shifters) are described which employ an active element formed from a chromophore including an electron donor group, an electron acceptor group, and a  $\pi$ -conjugate bridge structure between the electron donor group and the electron acceptor group which includes  $\geq 1$  non-aromatic 5-, 6-, or 7-membered ring which lock(s) one or two carbon-carbon double bond(s) of the conjugate bridge structure and in which the electron acceptor group is connected to the bridge ring structure with a conjugated diene or triene. The bridge may contain a bithiophene unit. The chromophores may be doped into a polymer, preferably a bisphenol A carbonate-4,4'-(3,3,5-trimethylcyclohexylidene)diphenol carbonate copolymer. The devices may be packaged in inert gas filled packages.

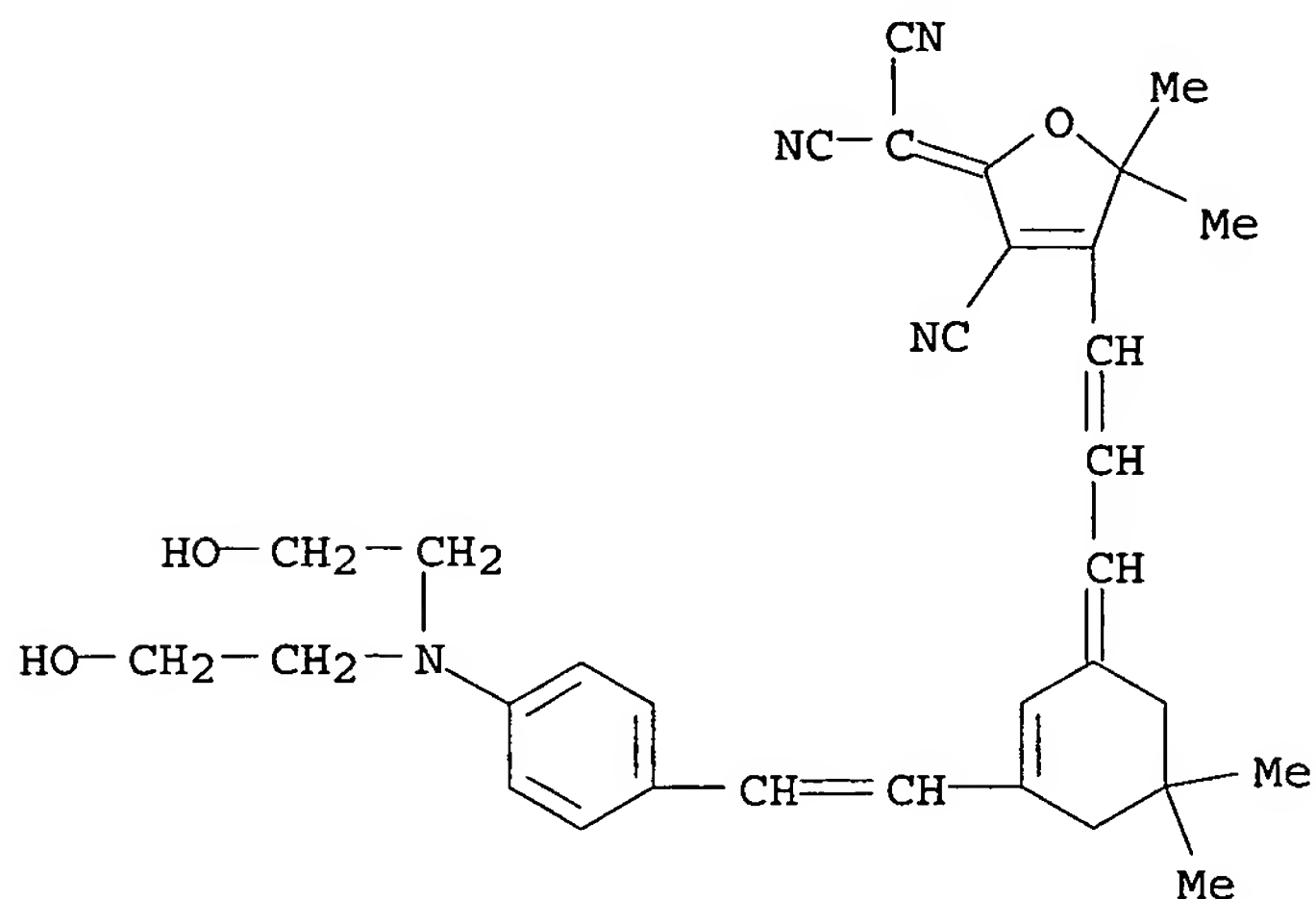
IT 224784-30-9 265992-52-7 266348-40-7  
266348-41-8 296280-34-7 351444-91-2  
351444-93-4 351444-95-6 351444-98-9  
351445-03-9 351445-05-1

RL: DEV (Device component use); USES (Uses)  
(nonlinear optical devices employing sterically stabilized

polyene-bridged second-order nonlinear optical chromophores)

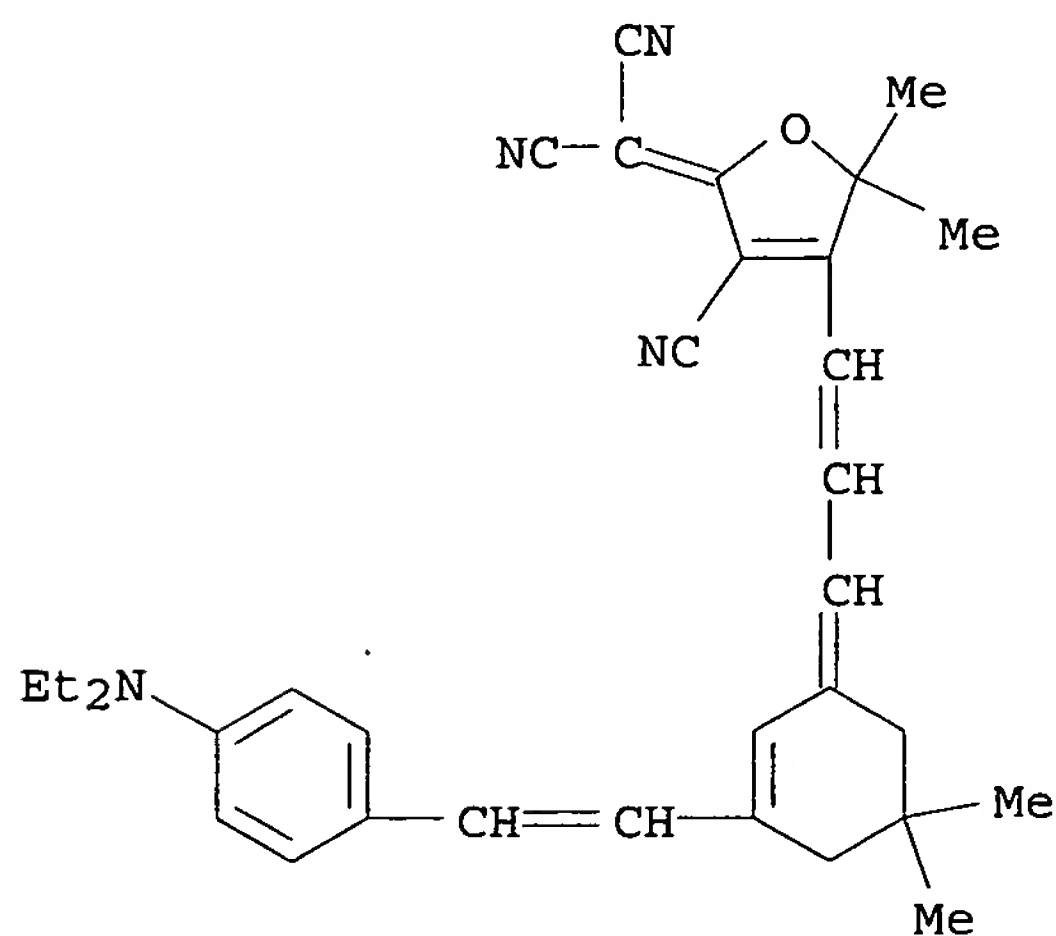
RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 265992-52-7 HCAPLUS

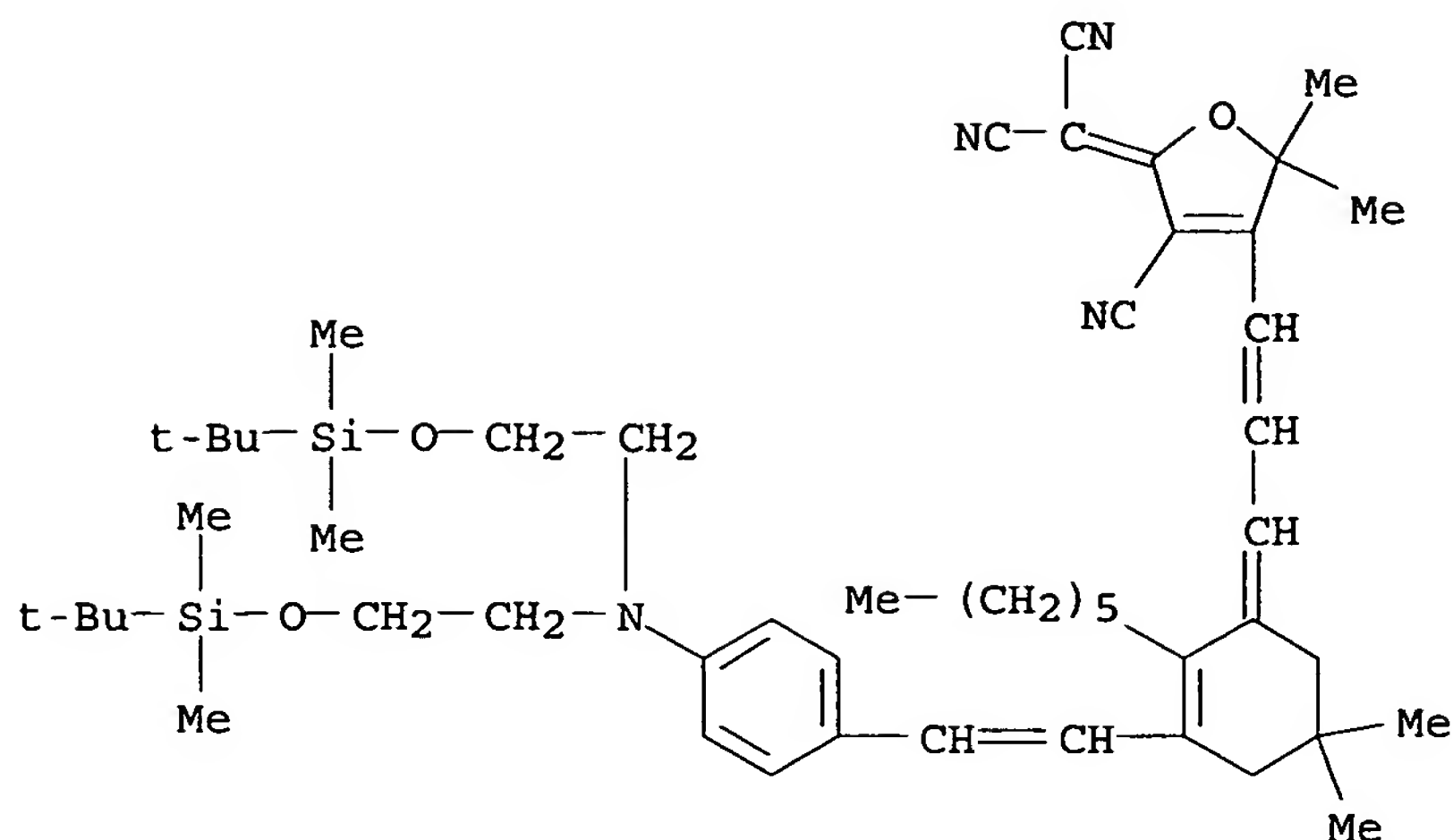
CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 266348-40-7 HCAPLUS

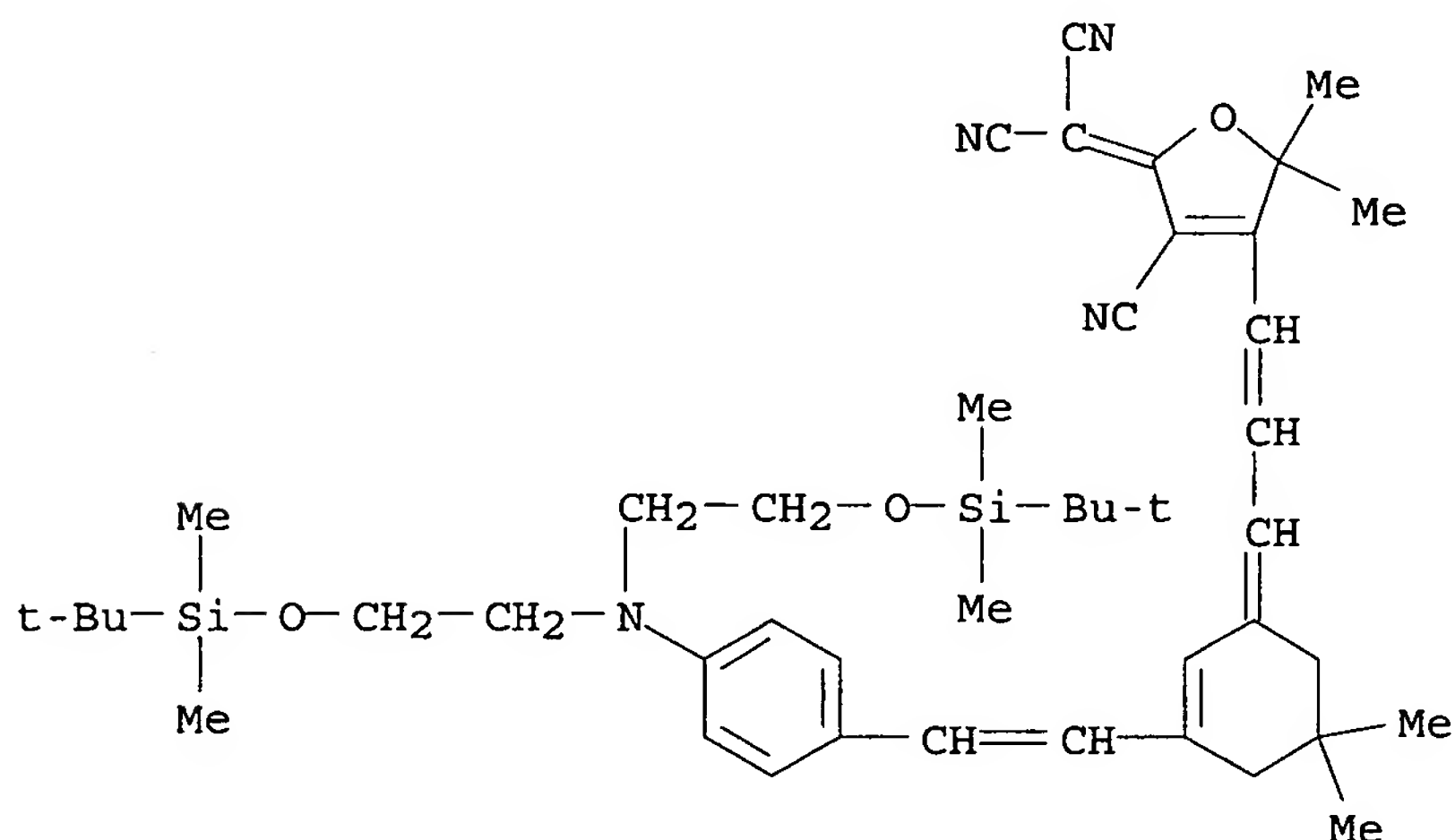
CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl]dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)





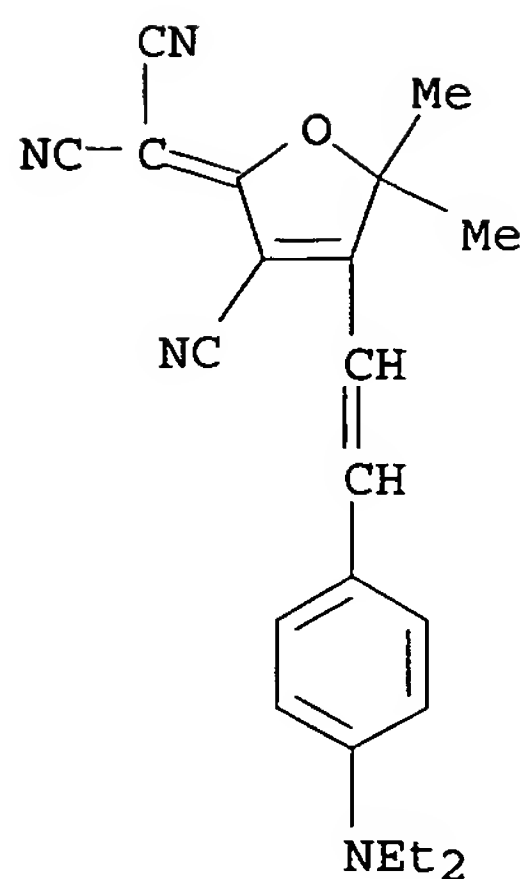
RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



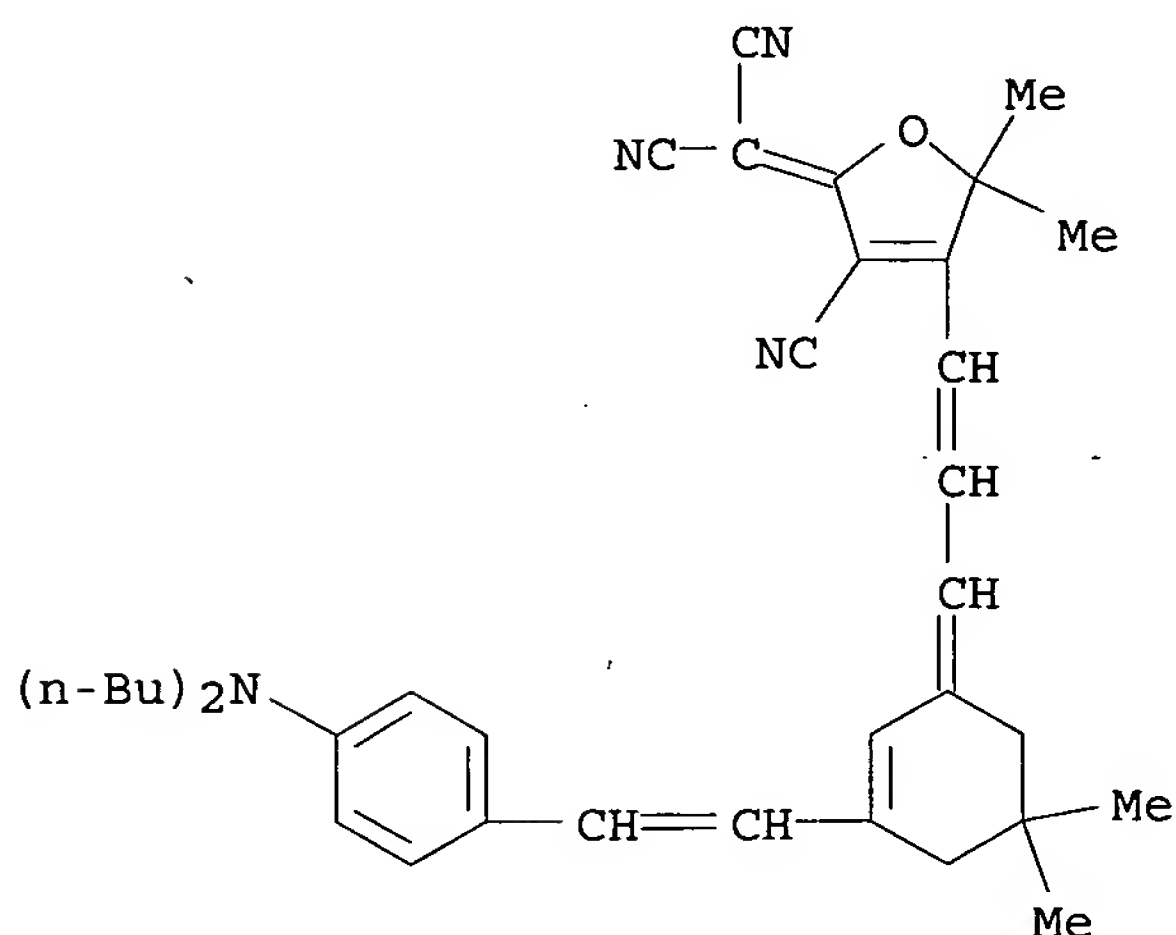
RN 296280-34-7 HCAPLUS

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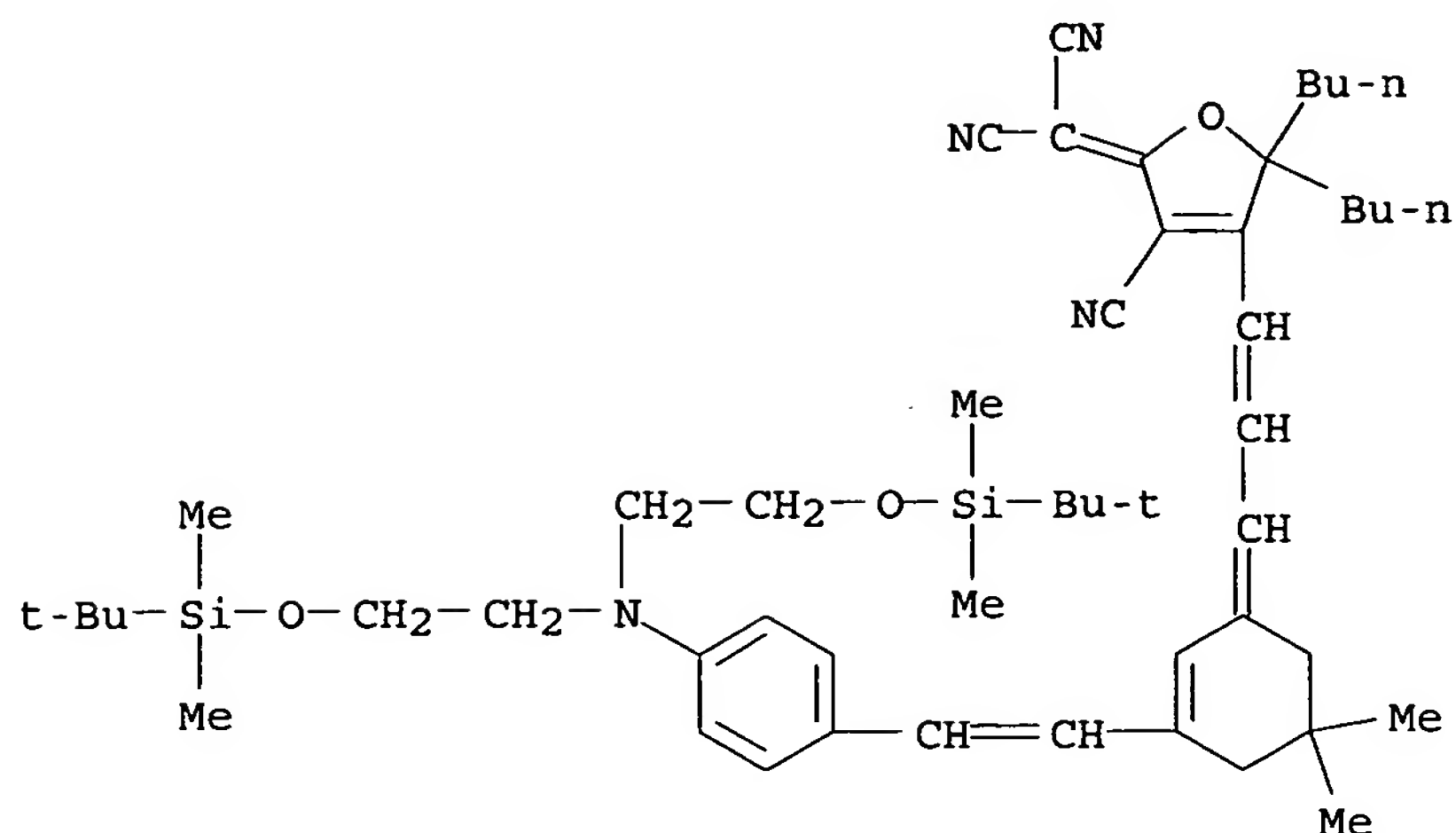
RN 351444-91-2 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(dibutylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



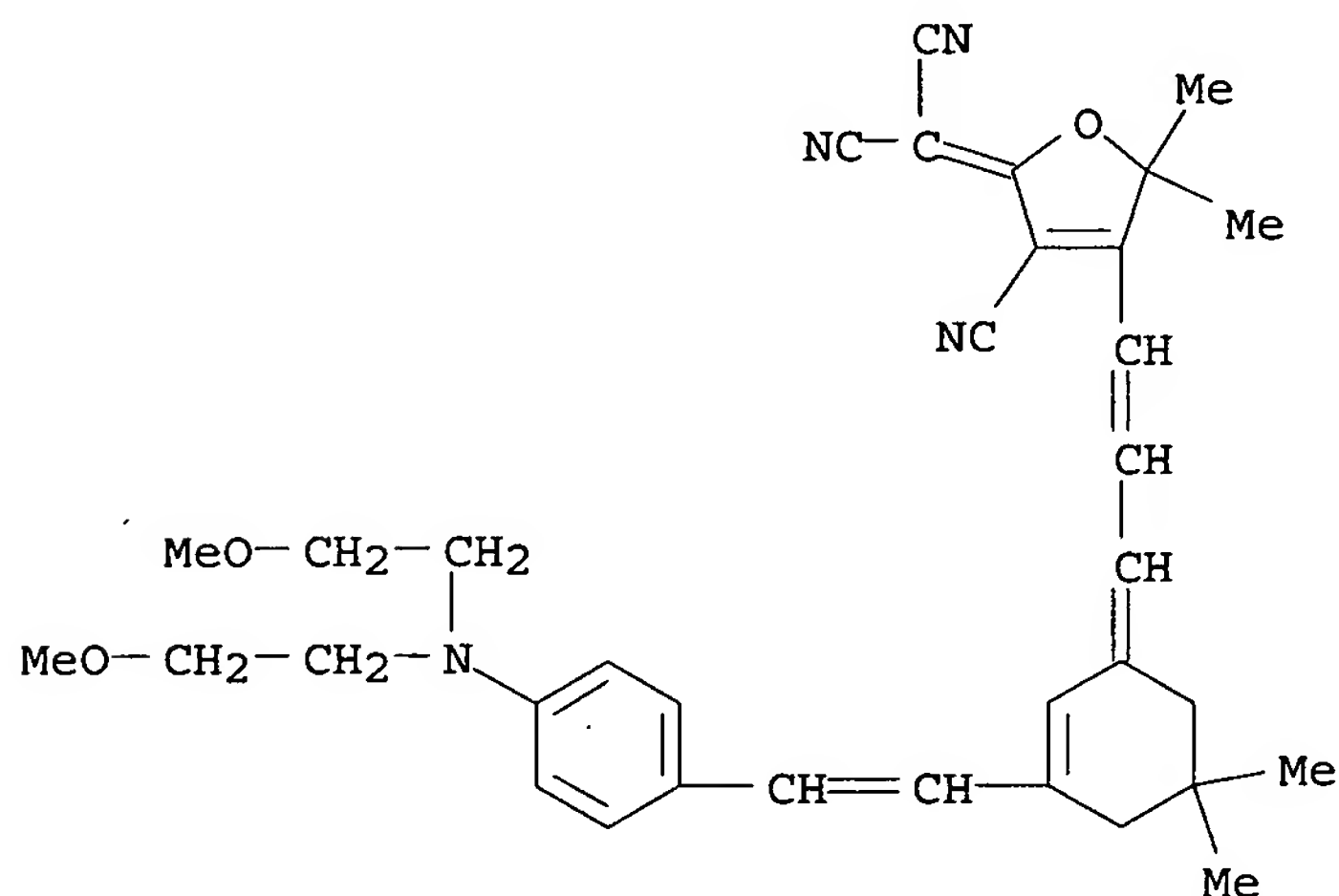
RN 351444-93-4 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl]dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



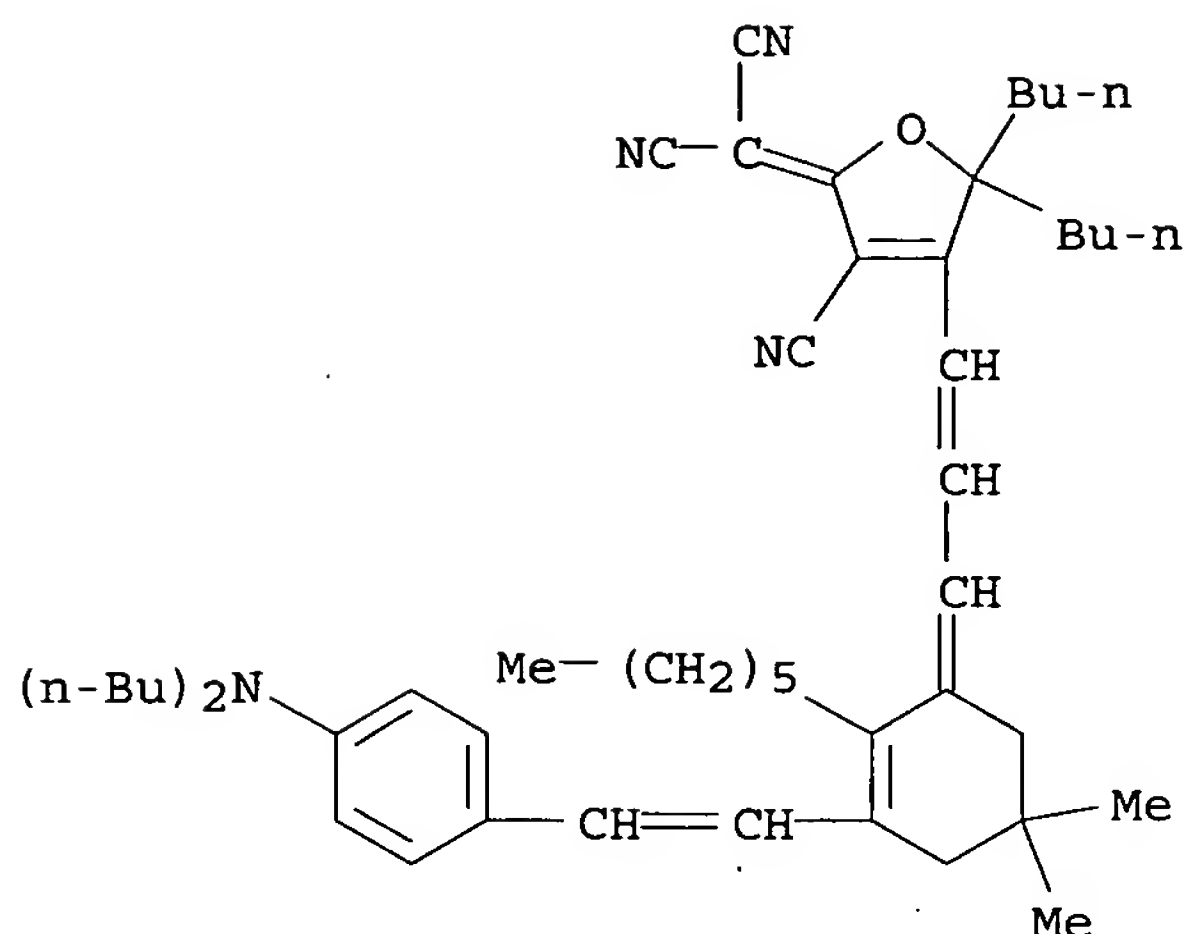
RN 351444-95-6 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



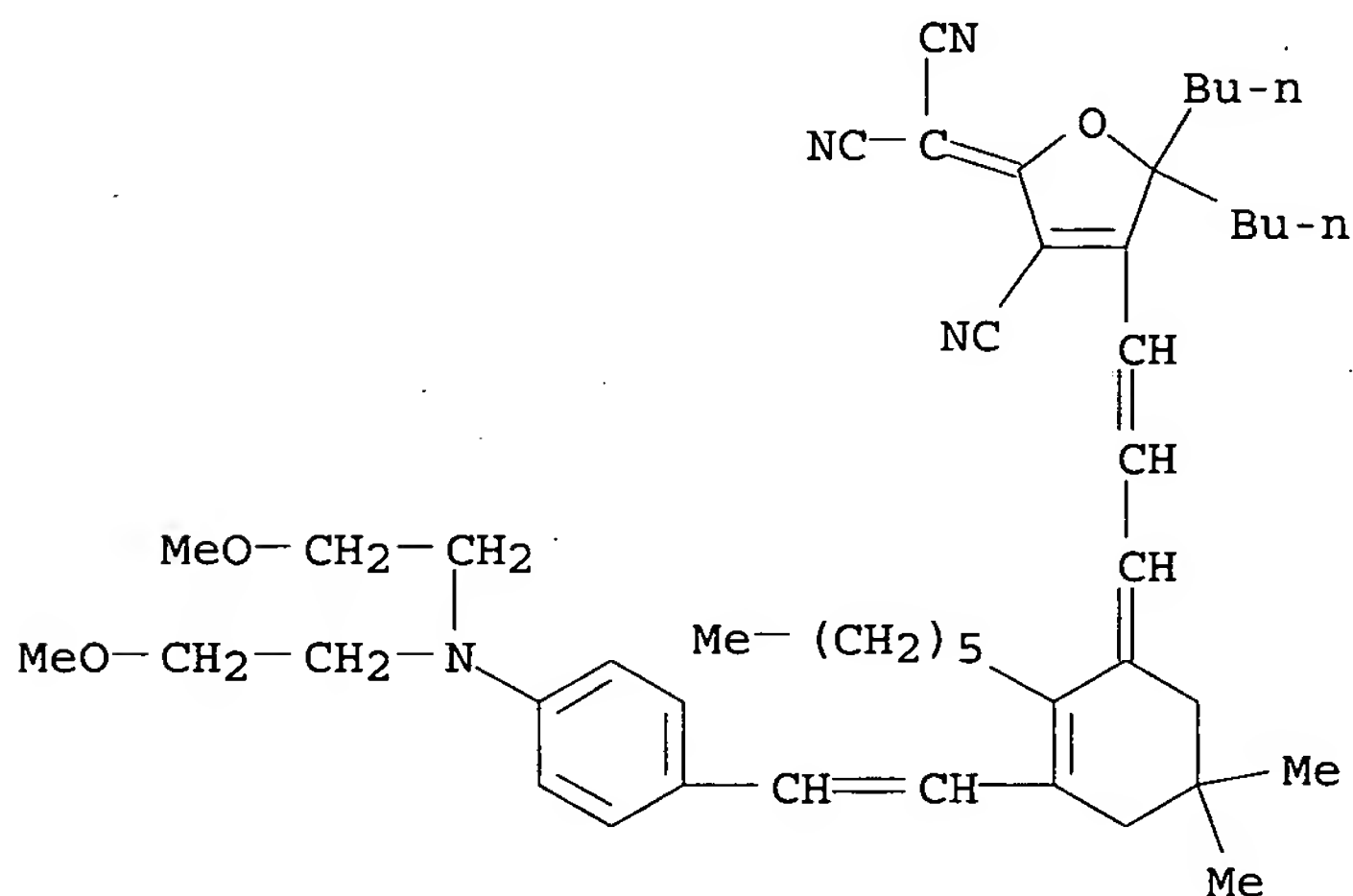
RN 351444-98-9 HCAPLUS

CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[3-[2-[4-(dibutylamino)phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



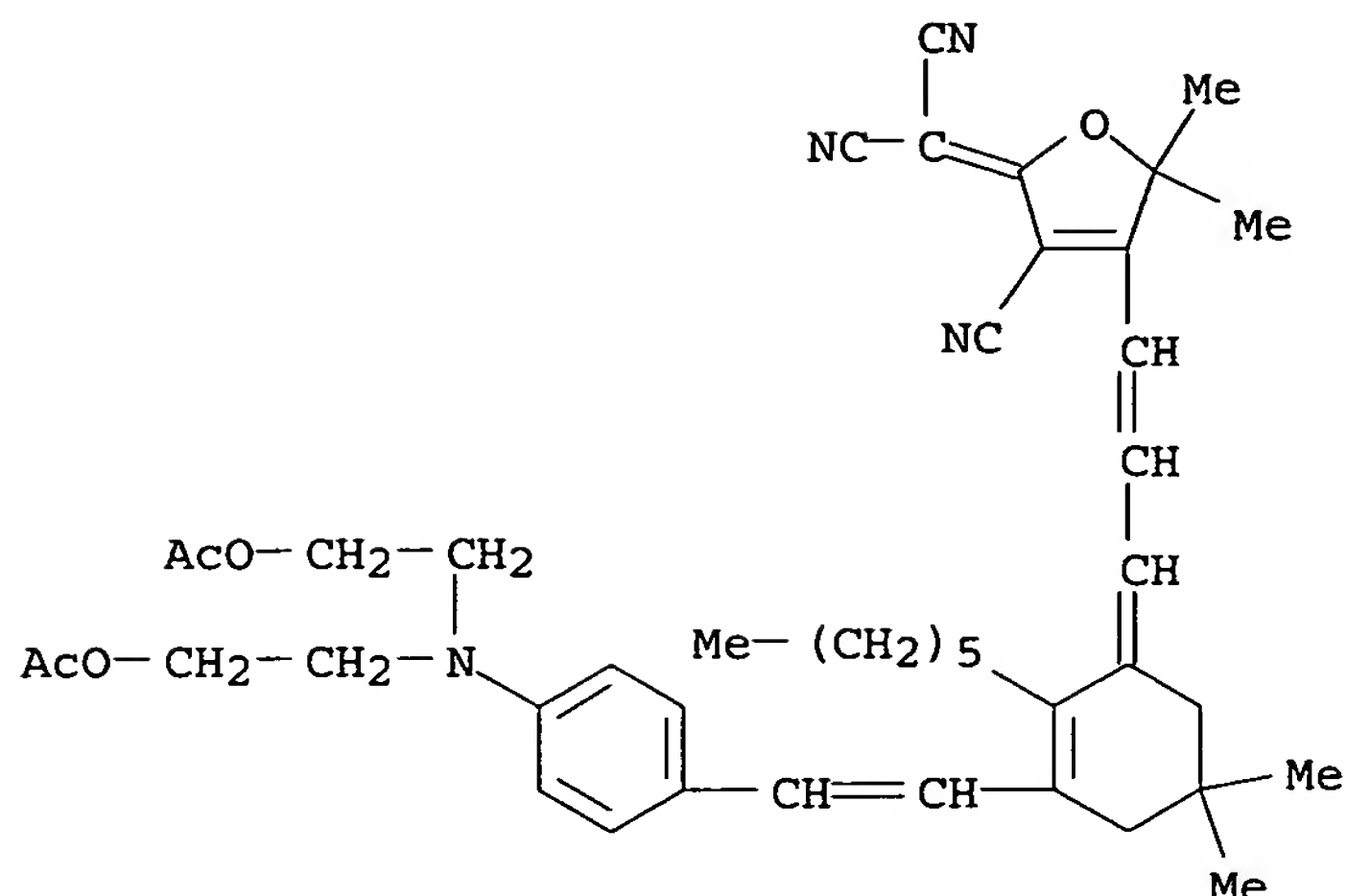
RN 351445-03-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



RN 351445-05-1 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)

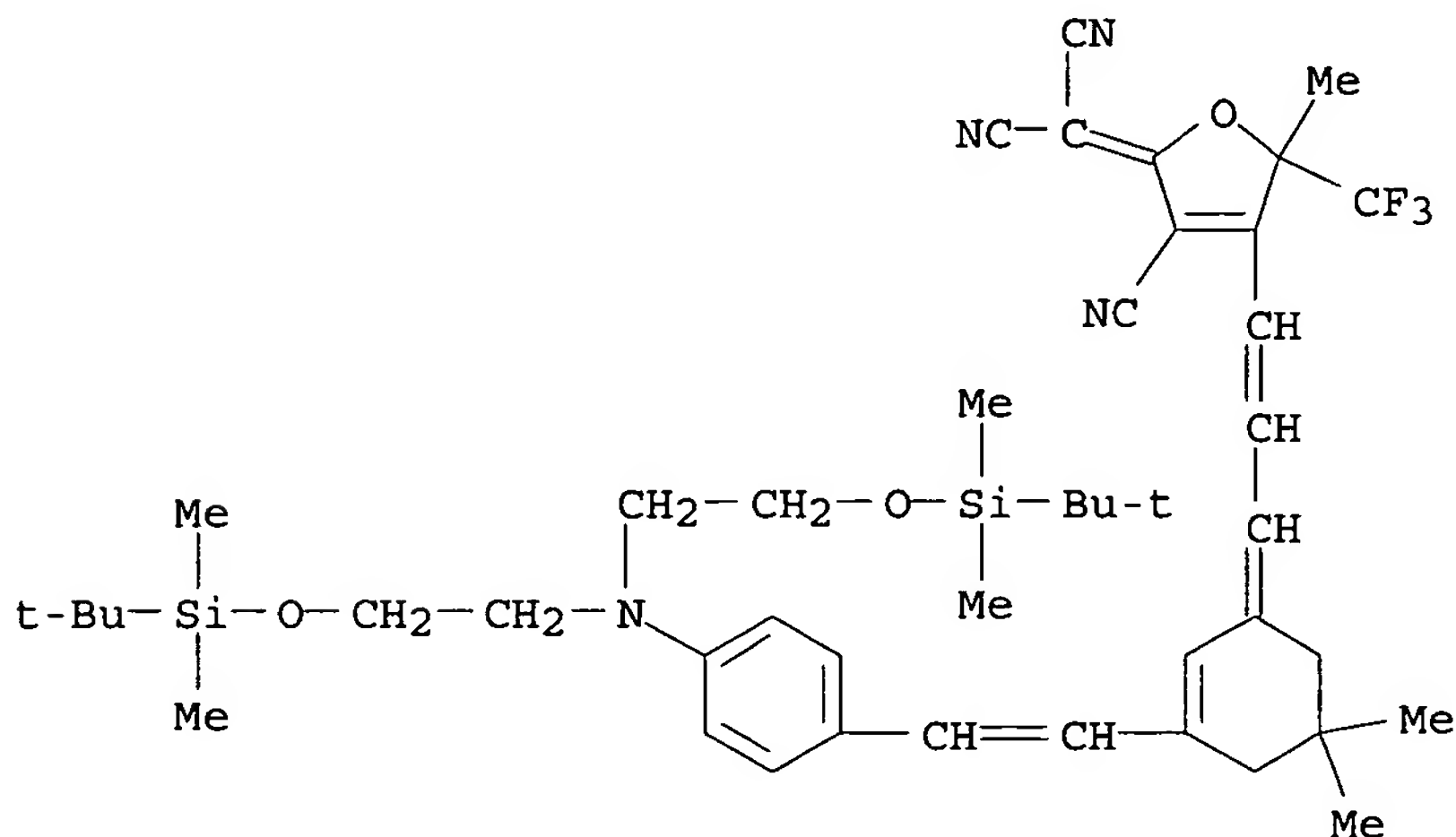


IT 369609-51-8P

RL: DEV (Device component use); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)  
(nonlinear optical devices employing sterically stabilized polyene-bridged second-order nonlinear optical chromophores)

RN 369609-51-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[ (1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



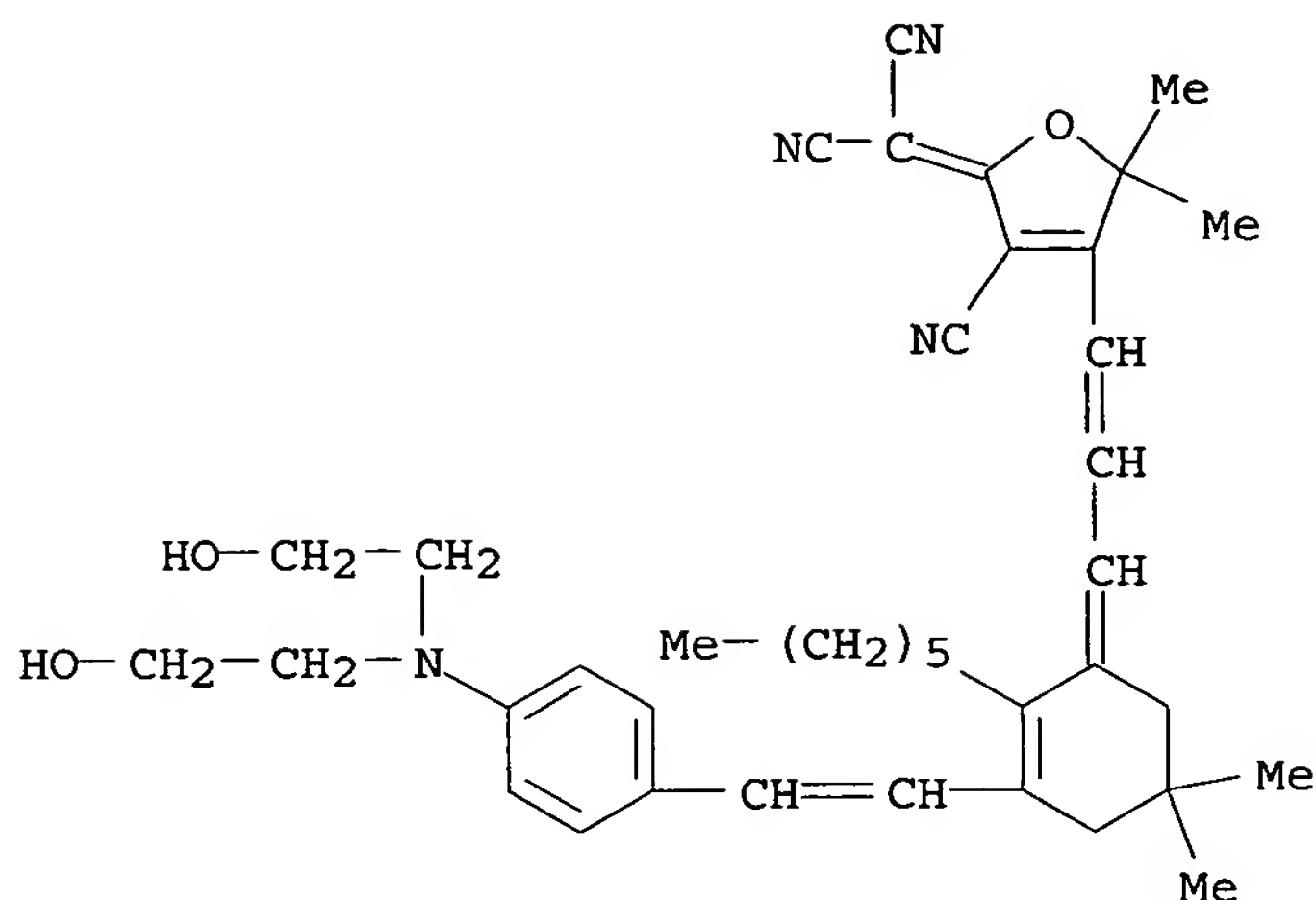
IT 259653-88-8P 369397-06-8P 369397-36-4P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(nonlinear optical devices employing sterically stabilized polyene-bridged second-order nonlinear optical chromophores)

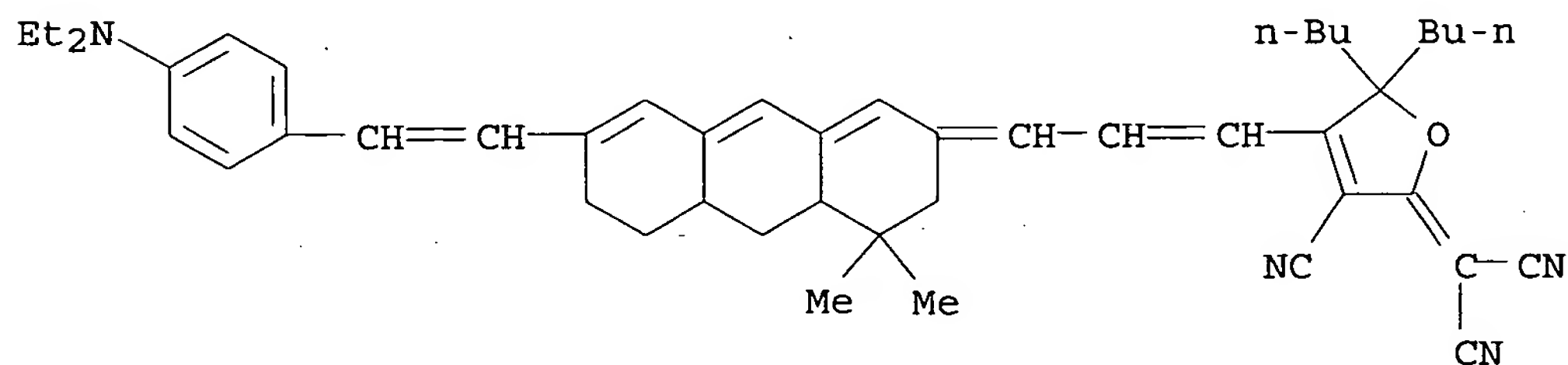
RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



RN 369397-06-8 HCAPLUS

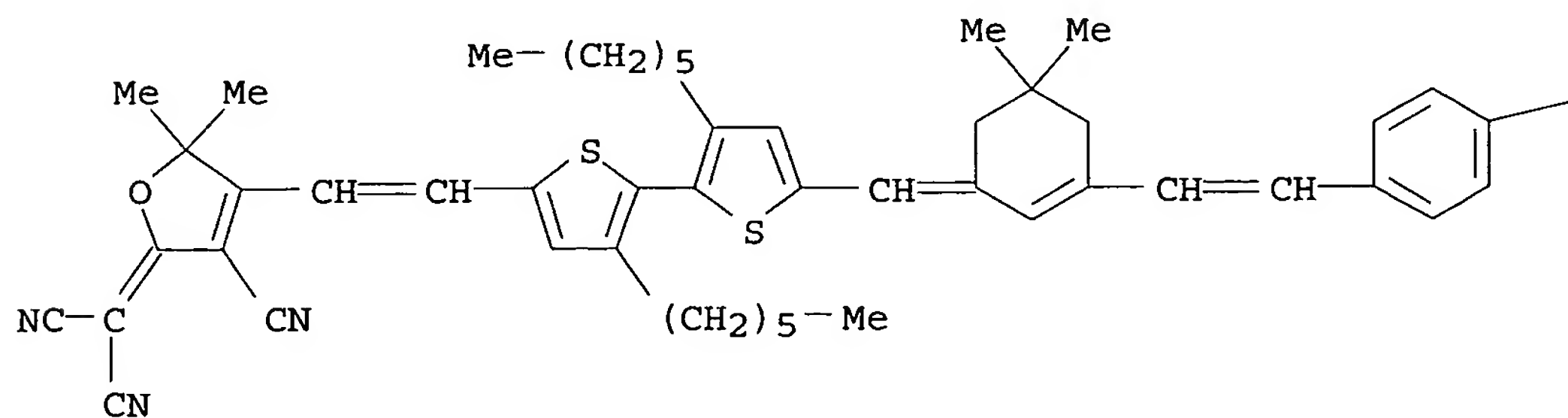
CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[7-[2-[4-(diethylamino)phenyl]ethenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]-1-propenyl]-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 369397-36-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5'-[[3-[2-[4-(dimethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]methyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

PAGE 1-A



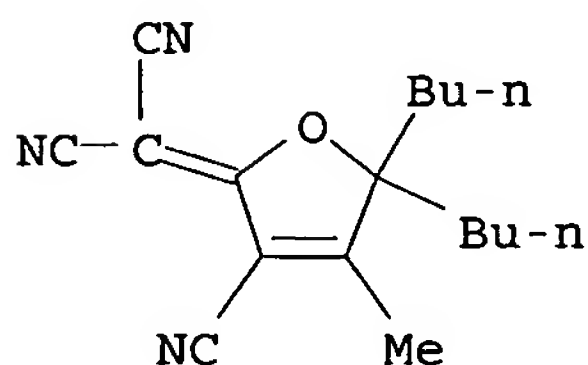
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IT 326597-50-6 369609-49-4

RL: RCT (Reactant); RACT (Reactant or reagent)  
(nonlinear optical devices employing sterically stabilized  
polyene-bridged second-order nonlinear optical chromophores)

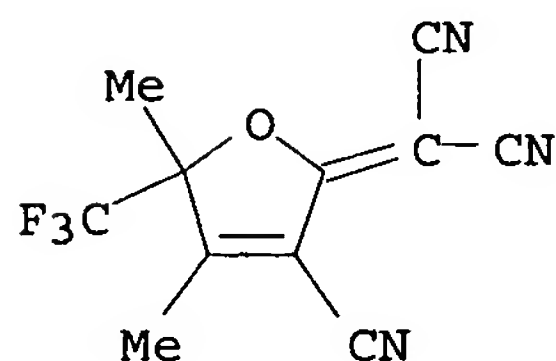
RN 326597-50-6 HCAPLUS

CN Propanedinitrile, (5,5-dibutyl-3-cyano-4-methyl-2(5H)-furanylidene) - (9CI)  
(CA INDEX NAME)



RN 369609-49-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-  
furanylidene] - (9CI) (CA INDEX NAME)

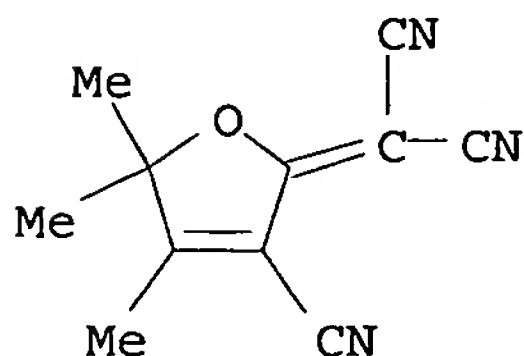


IT 171082-32-9P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
(Reactant or reagent)  
(nonlinear optical devices employing sterically stabilized  
polyene-bridged second-order nonlinear optical chromophores)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA  
INDEX NAME)



REFERENCE COUNT:

75

THERE ARE 75 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 74 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:115747 HCAPLUS

DOCUMENT NUMBER: 137:25863

TITLE: Analysis of poling-induced polymer waveguide losses in push-pull Mach-Zehnder modulators

AUTHOR(S): Yacoubian, Araz; Lin, Weiping; Olson, David J.; Bechtel, James H.

CORPORATE SOURCE: Photonics Technology Group, IPITEK, USA

SOURCE: Proceedings of SPIE-The International Society for Optical Engineering (2001), 4455(Micro- and Nano-optics for Optical Interconnection and Information Processing), 181-188

CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Poling induced losses of split-ground plane, push-pull polymeric electrooptic modulators were studied. Two sources of loss are found: loss due to the presence of O and loss due to deforming the waveguide structure by large poling fields. Deformation is the most severe at the edges of the electrodes, where the elec. field amplitude is largest. Expts. were done by poling waveguides with different architectures and poling in air and in an inert atmospheric. There is an apparent rapid increase in poling induced loss (to the 4th power) with poling voltage due to the presence of O ( $\leq 6.5$  dB/cm for poling field of  $170 \text{ V}/\mu\text{m}$ ), whereas loss due to deformation increases linearly with poling voltage ( $\leq 2.5$  dB/cm). O-induced loss can be minimized by poling in inert atmospheric, while deformation

induced loss can be minimized by optimizing device architecture.

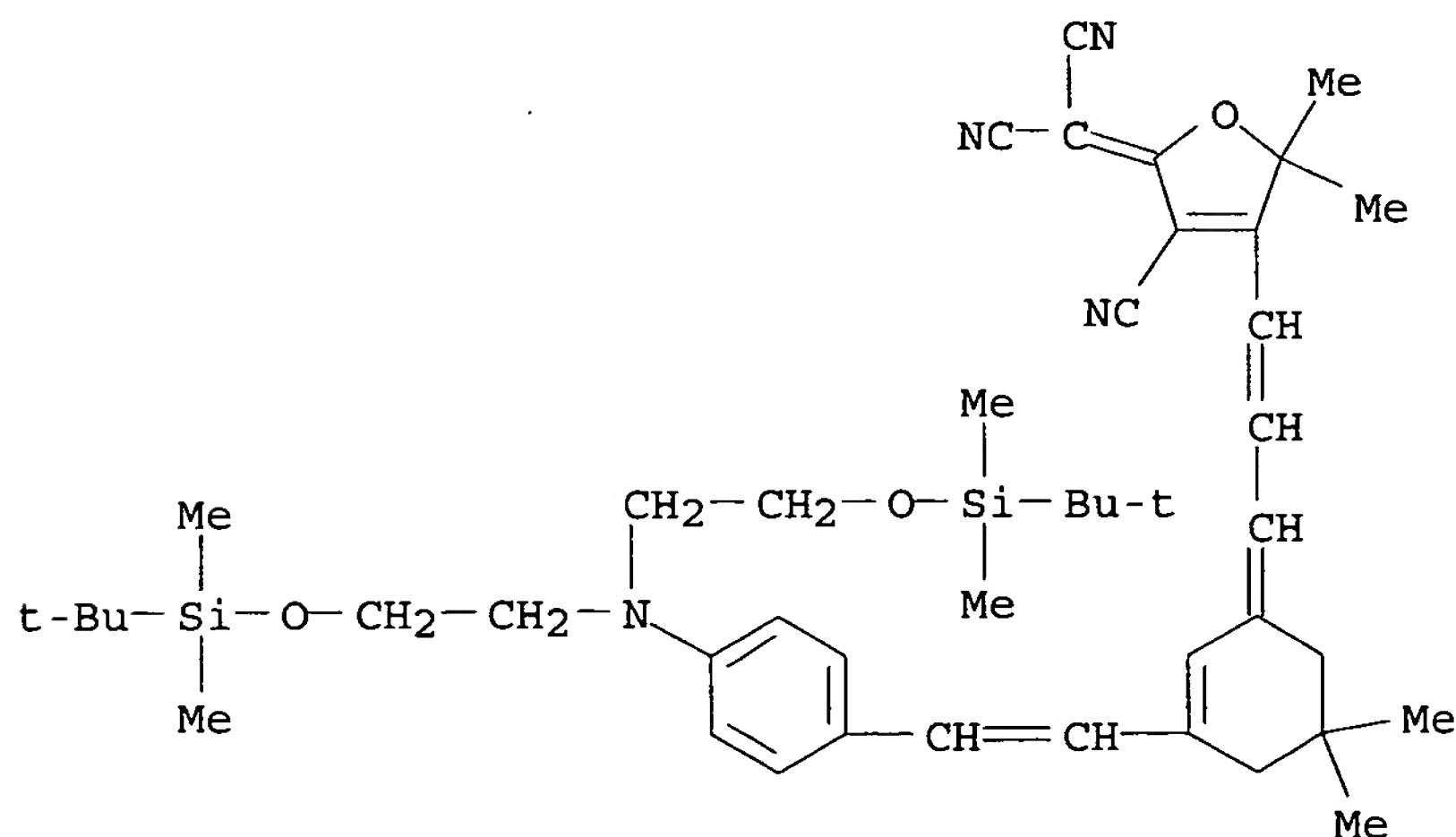
IT 266348-41-8

RL: DEV (Device component use); USES (Uses)

(chromophore; waveguide poling-induced losses in push-pull Mach-Zehnder modulators)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene]-(9CI) (CA INDEX NAME)





REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 75 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2002:90034 HCAPLUS  
 DOCUMENT NUMBER: 136:136245  
 TITLE: Hyperpolarizable organic chromophores  
 INVENTOR(S): Dalton, Larry R.; Jen, Alex Kwan-Yue; Londergan, Timothy; Carlson, William Brenden; Phelan, Gregory; Huang, Diyun; Casmier, Daniel; Ewy, Todd; Buker, Nicholas  
 PATENT ASSIGNEE(S): University of Washington, USA  
 SOURCE: PCT Int. Appl., 104 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 1  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2002008215	A1	20020131	WO 2001-US23339	20010724
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
CA 2417000	AA	20020131	CA 2001-2417000	20010724
US 2002084446	A1	20020704	US 2001-912444	20010724
EP 1305305	A1	20030502	EP 2001-957237	20010724
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2004508430	T2	20040318	JP 2002-514121	20010724
PRIORITY APPLN. INFO.:			US 2000-220321P	P 20000724
			WO 2001-US23339	W 20010724

OTHER SOURCE(S): MARPAT 136:136245

AB The present invention provides hyperpolarizable organic chromophores based on heterocyclic compds. The chromophores are nonlinear optically active compds. that include a  $\pi$ -donor conjugated to a  $\pi$ -acceptor through a  $\pi$ -electron conjugated bridge. Macromol. structures including the hyperpolarizable organic chromophores are also provided.

IT 392662-55-4P

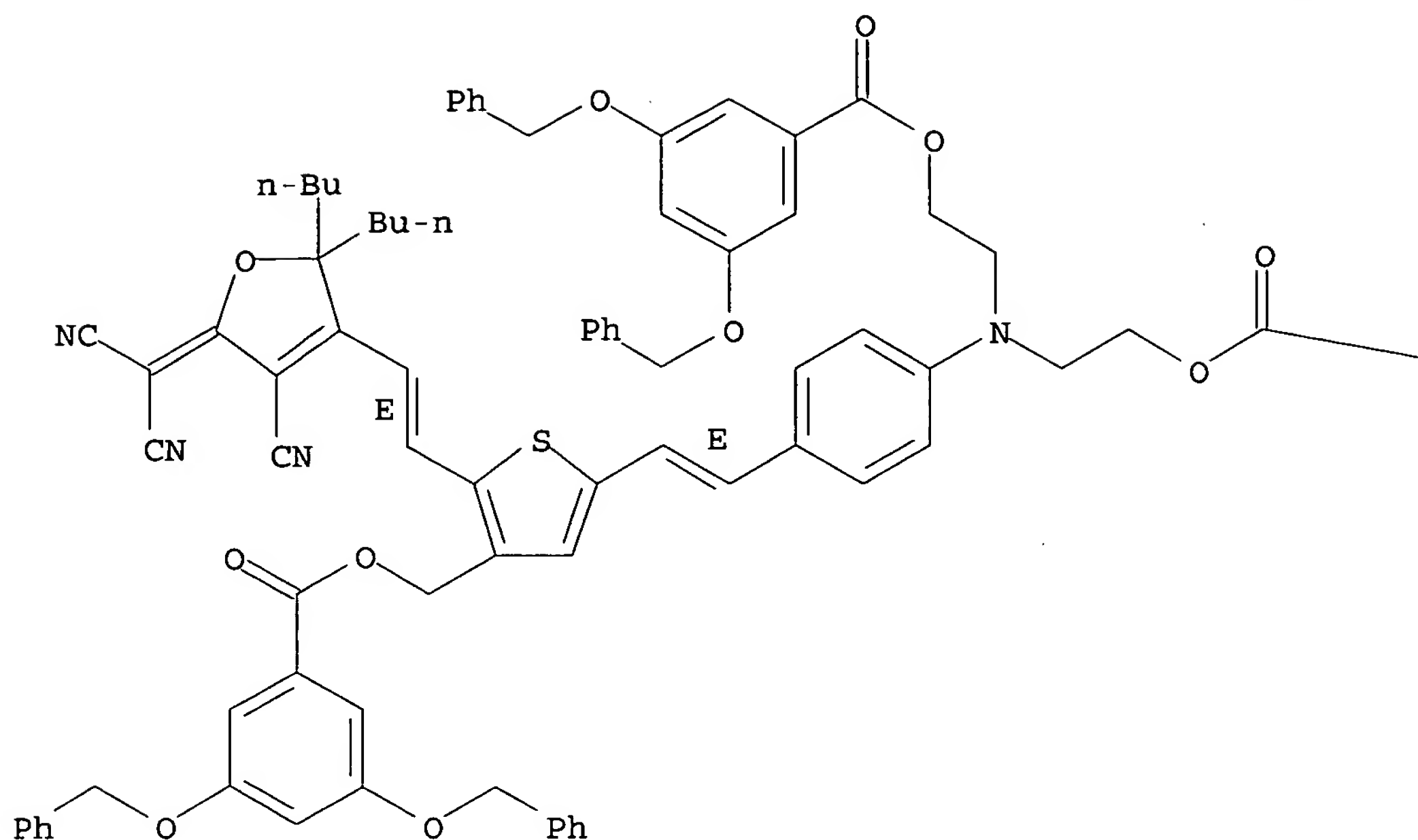
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
 (dendrimer chromophore; production of donor-acceptor conjugated hyperpolarizable heterocyclic organic chromophores)

RN 392662-55-4 HCAPLUS

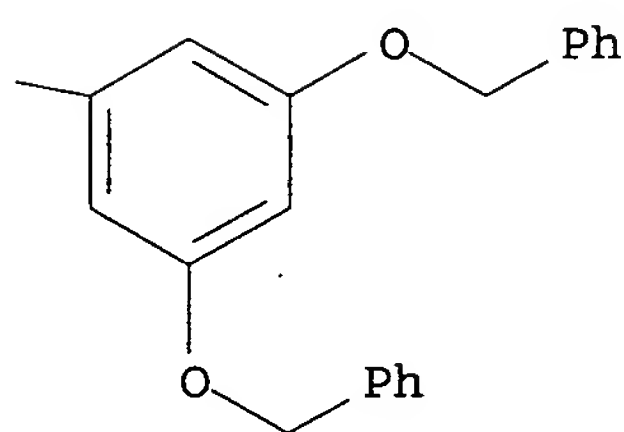
CN Benzoic acid, 3,5-bis(phenylmethoxy)-, [[4-[(1E)-2-[4-[[[3,5-bis(phenylmethoxy)benzoyl]oxy]methyl]-5-[(1E)-2-[2,2-dibutyl-4-cyano-5-(dicyanomethylene)-2,5-dihydro-3-furanyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B



IT 392662-59-8P 392662-63-4P

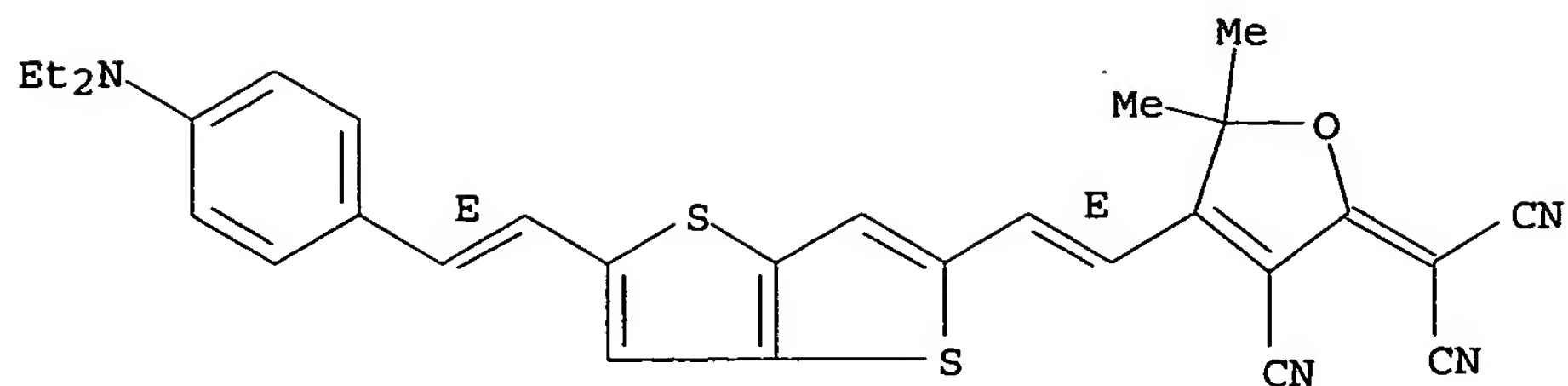
RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(green chromophore; production of donor-acceptor conjugated hyperpolarizable heterocyclic organic chromophores)

RN 392662-59-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-[5-[(1E)-2-[4-(diethylamino)phenyl]ethenyl]thieno[3,2-b]thien-2-yl]ethenyl]-5,5-dimethyl-2(5H)-furanlidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

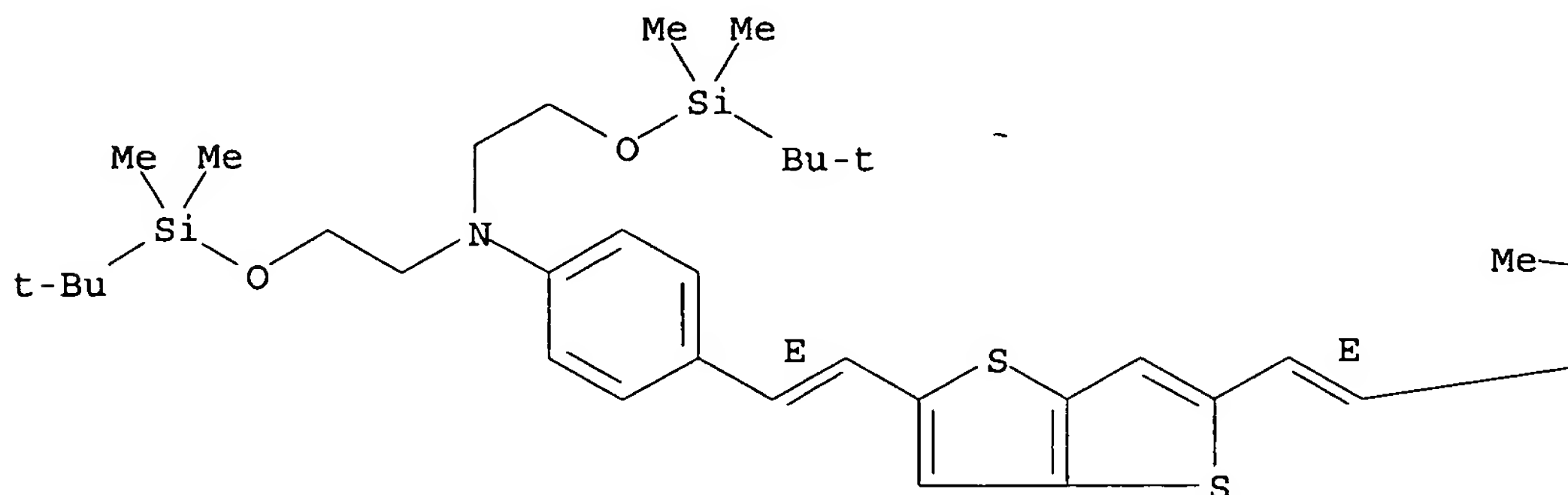


RN 392662-63-4 HCAPLUS

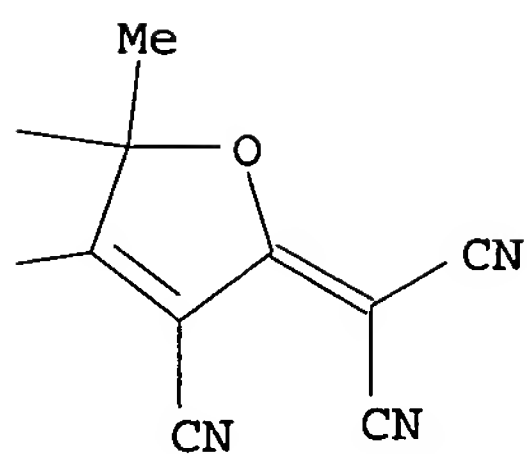
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]thieno[3,2-b]thien-2-yl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene] - (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

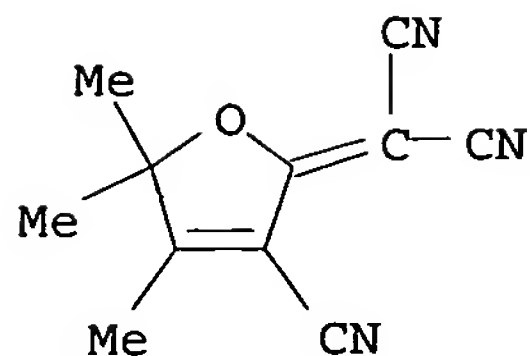


IT 171082-32-9 392662-54-3

RL: RCT (Reactant); RACT (Reactant or reagent)  
(starting material; production of donor-acceptor conjugated hyperpolarizable heterocyclic organic chromophores)

RN 171082-32-9 HCAPLUS

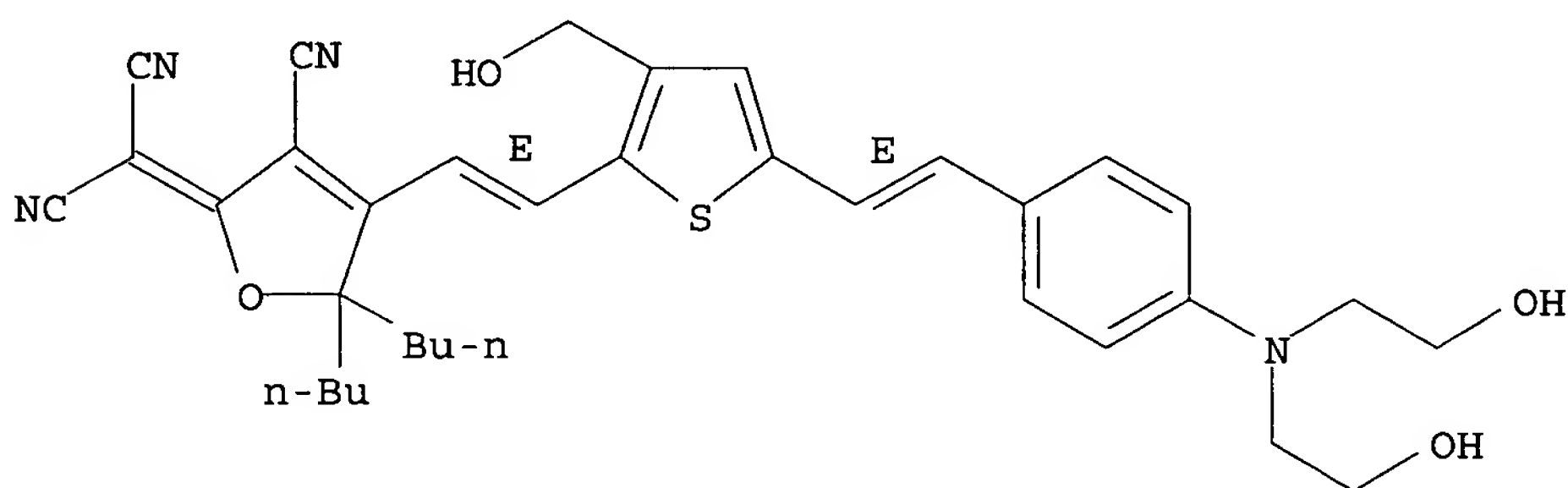
CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furan-2-ylidene) - (9CI) (CA INDEX NAME)



RN 392662-54-3 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3-(hydroxymethyl)-2-thienyl]ethenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 5 THERE ARE 5 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 76 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:86964 HCAPLUS

DOCUMENT NUMBER: 136:316538

TITLE: Recent advances in electrooptic polymer modulators incorporating highly nonlinear chromophore

AUTHOR(S): Oh, Min-Cheol; Zhang, Hua; Zhang, Cheng; Erlig, Hernan; Chang, Yian; Tsap, Boris; Chang, Dan; Szep, Attila; Steier, William H.; Fetterman, Harold R.; Dalton, Larry R.

CORPORATE SOURCE: Pacific Wave Industries, Los Angeles, CA, 90024, USA

SOURCE: IEEE Journal of Selected Topics in Quantum Electronics (2001), 7(5), 826-835

CODEN: IJSQEN; ISSN: 1077-260X

PUBLISHER: Institute of Electrical and Electronics Engineers

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Based on a nonlinear optical polymer with a highly nonlinear chromophore (CLD) dispersed in an amorphous polycarbonate (APC), the authors have developed electrooptic (EO) polymer modulators operating at 1550-nm wavelength with low loss and good thermal stability. By incorporating polymer insulation layer, push-pull poling was successfully performed without film damages. Also the propagation loss of the EO polymer waveguide could be reduced  $\geq 1.2$  dB/cm at 1550 nm when the large core waveguide structure was incorporated. The long-term reliabilities of the EO polymer modulator made of CLD/APC polymer were studied. When the modulator was hermetically sealed in an inert gas, the Vp change of a

Mach-Zehnder modulator was negligible over 30 d of operation with 20-mW exposure to the waveguide input. In the thermal stability measurement, 25% Vp increase was observed from the sample heated to 60°C over 40 d, though the sample left at room temperature showed no decay of nonlinearity.

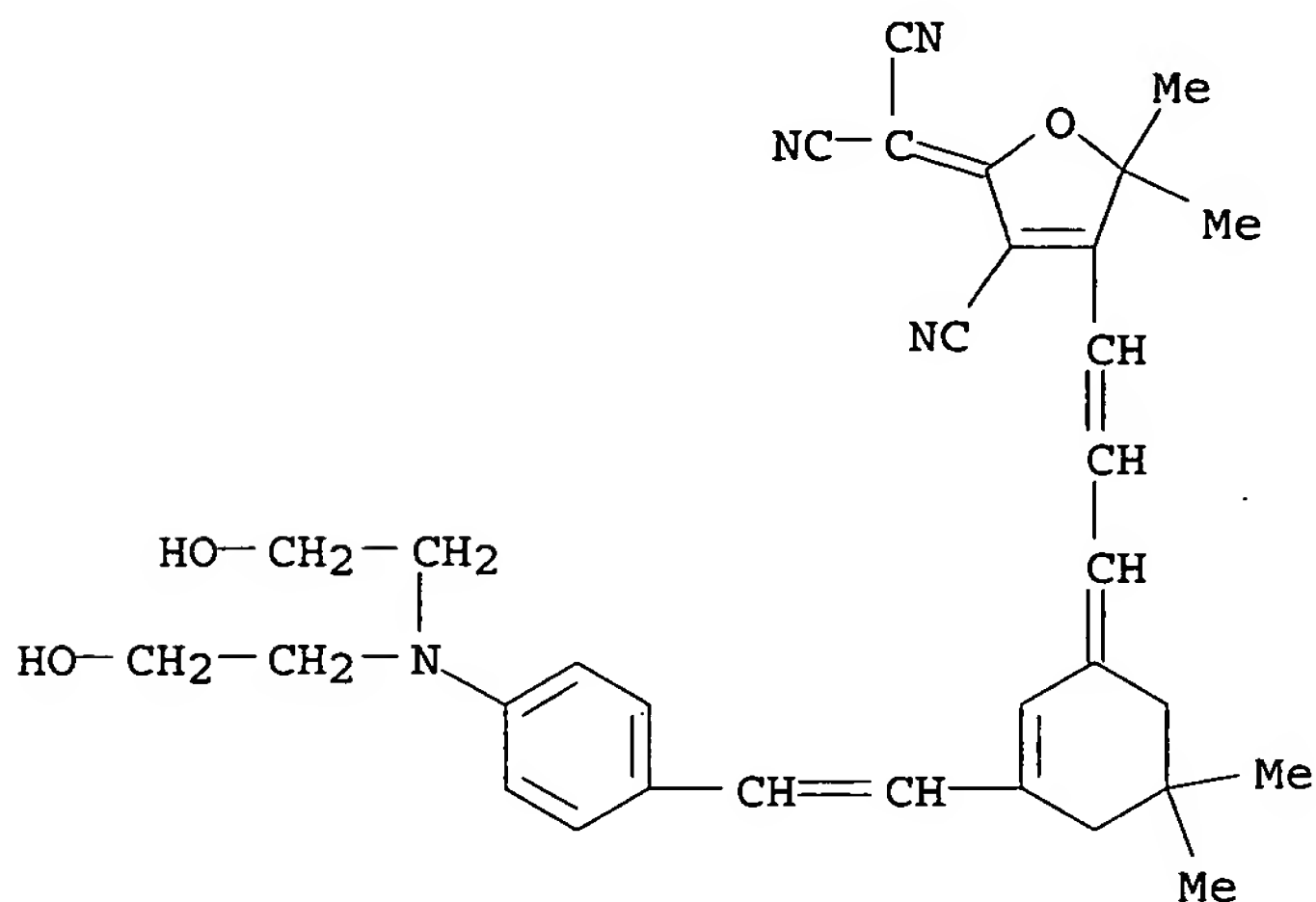
IT 224784-30-9D, t-butyldimethylsilane derivs. 265992-52-7

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

(recent advances in electrooptic polymer modulators incorporating highly nonlinear chromophore)

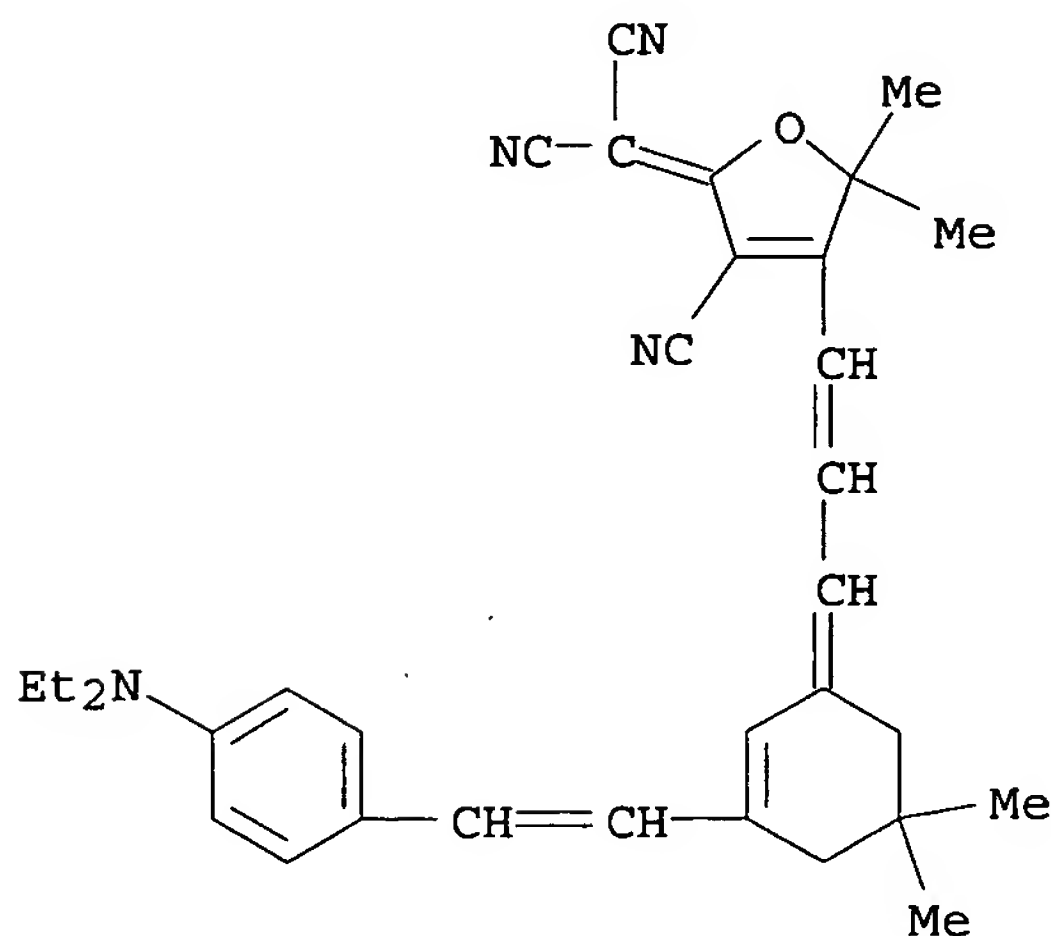
RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 265992-52-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 32 THERE ARE 32 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 77 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2002:49603 HCAPLUS

DOCUMENT NUMBER: 136:332344

TITLE: Highly efficient and thermally stable organic/polymeric electro-optic materials by dendritic approach

AUTHOR(S): Jen, Alex K.-Y.; Ma, Hong; Sassa, Takafumi; Liu, Sen; Suresh, S.; Dalton, Larry Raymond; Haller, Marnie

CORPORATE SOURCE: Department of Materials Science and Engineering, University of Washington, Seattle, WA, 98195-2120, USA

SOURCE: Proceedings of SPIE-The International Society for Optical Engineering (2001), 4461 (Linear and Nonlinear Optics of Organic Materials), 172-179  
CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Dendron-modified nonlinear optical (NLO) chromophores and multiple chromophore-containing crosslinkable NLO dendrimers were developed. The enhancement of poling efficiency (40%) in the dendritic NLO chromophore/polymer guest/host system was obtained due to the significant minimization of intermol. electrostatic interactions among chromophores by the dendritic effect. Multiple NLO chromophore building blocks can be further placed into a dendrimer to construct precise mol. architecture with predetd. chemical composition. The site-isolation effect, through the encapsulation of NLO moieties by dendrons, can greatly enhance the performance of electrooptic (E-O) materials. A very large E-O coefficient ( $r_{33} = 60$  pm/V at  $1.55 \mu\text{m}$ ) and high temporal stability ( $85^\circ\text{C}$  for  $>1000$  h) were achieved in a NLO dendrimer developed through the double-end functionalization of a 3-dimensional shape phenyl-tetracyanobutadienyl (Ph-TCBD)-containing NLO chromophore with thermally crosslinkable trifluorovinylether-containing dendrons.

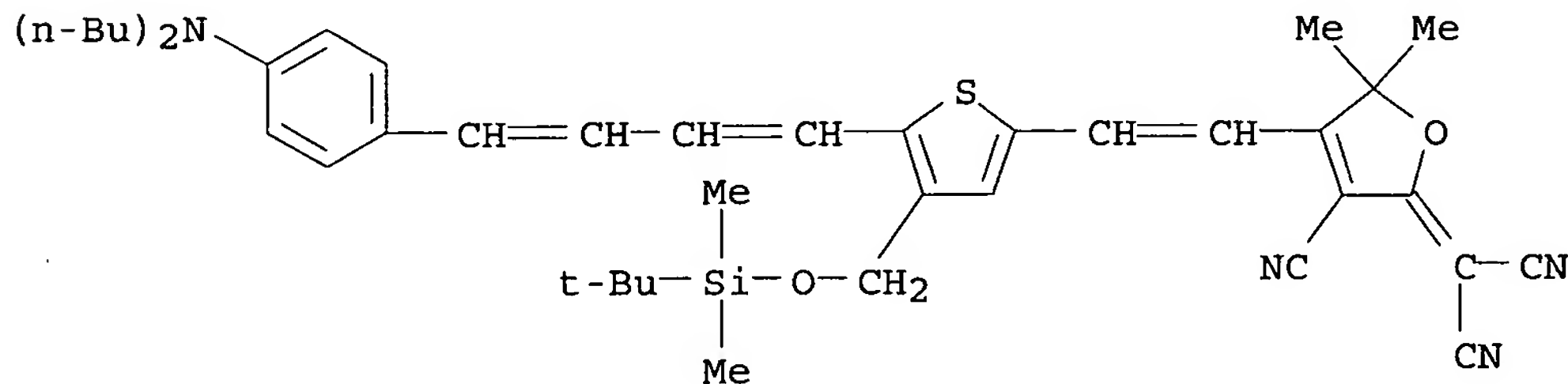
IT 413627-45-9 413627-50-6 413627-55-1

RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)

(highly efficient and thermally stable organic/polymeric electro-optic materials by dendritic approach)

RN 413627-45-9 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[5-[4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-4-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]methyl]-2-thienyl]ethenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

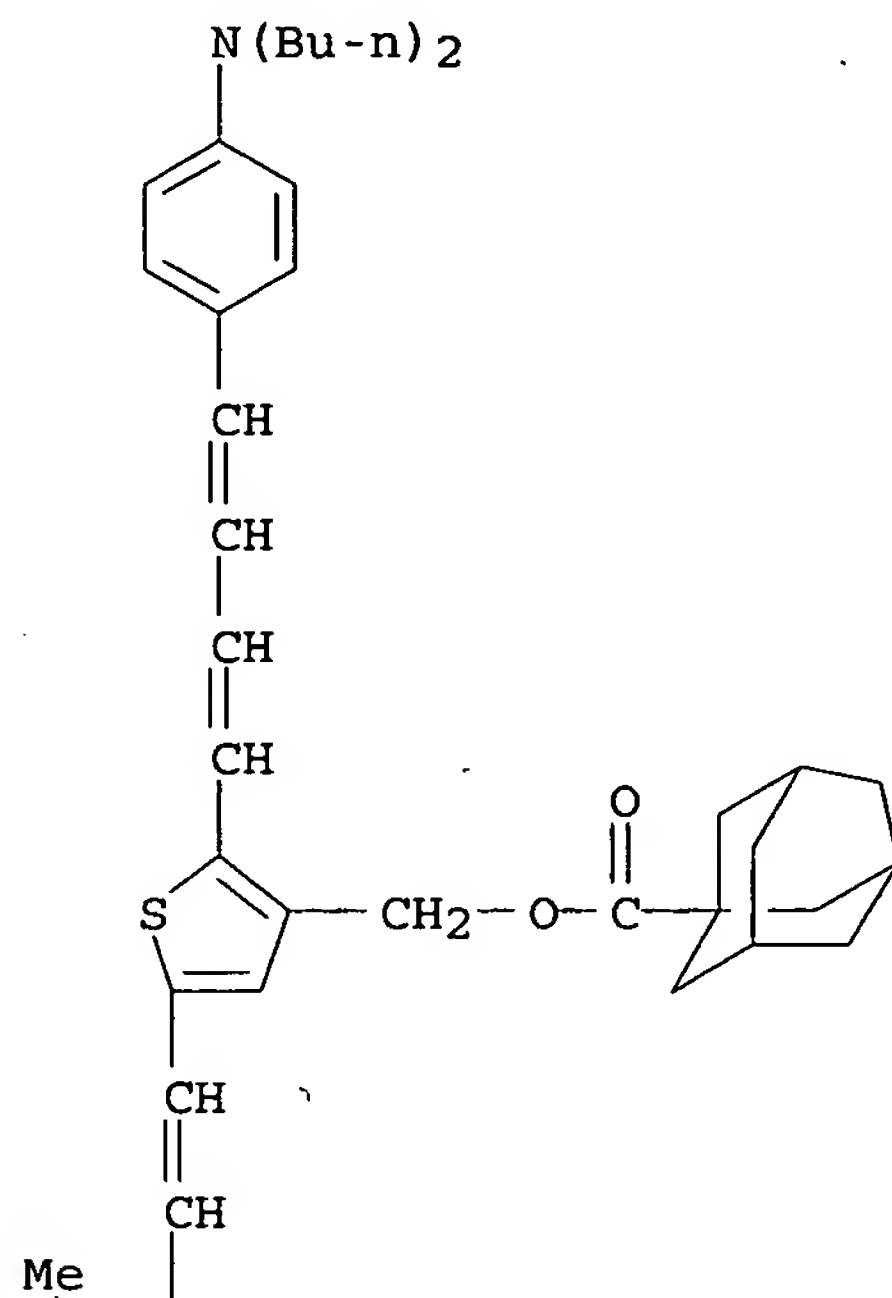


RN 413627-50-6 HCAPLUS

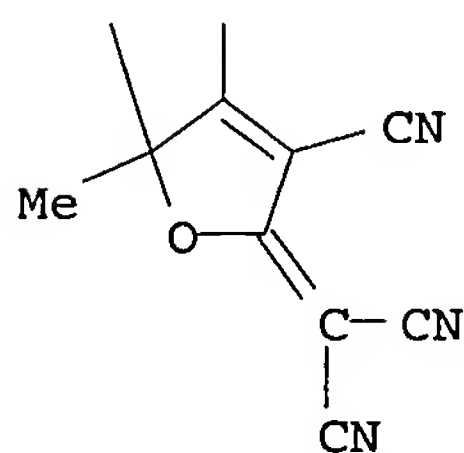
CN Tricyclo[3.3.1.1<sup>3,7</sup>]decane-1-carboxylic acid, [5-[2-[4-cyano-5-

(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-[4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-3-thienyl]methyl ester (9CI) (CA INDEX NAME)

PAGE 1-A

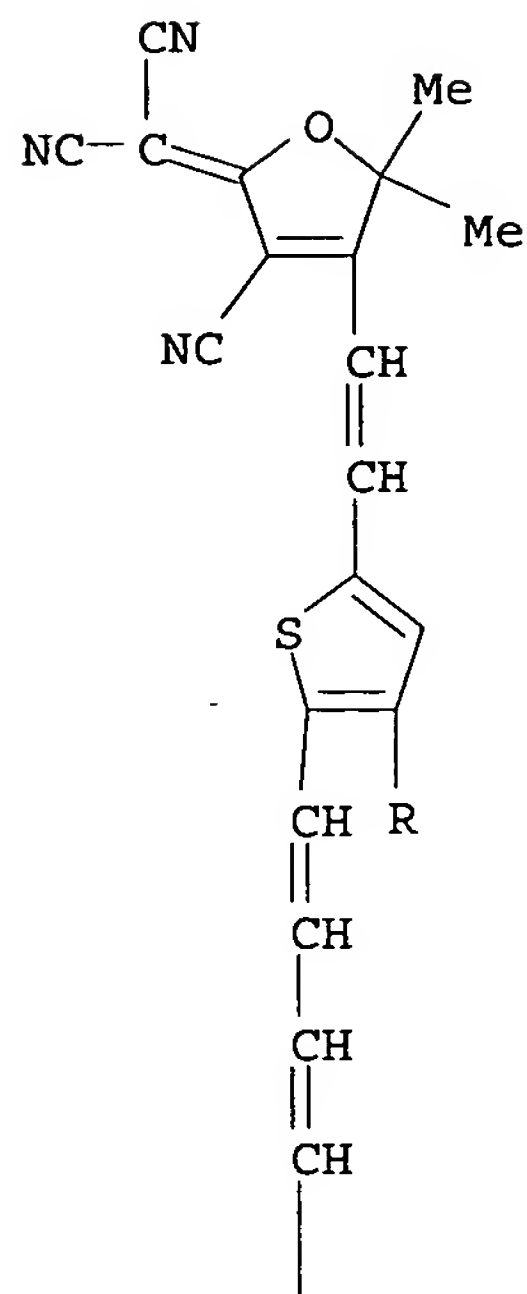


PAGE 2-A

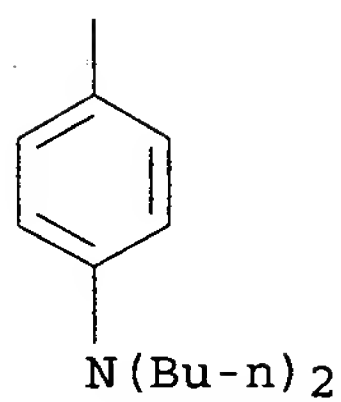


RN 413627-55-1 HCAPLUS  
 CN Benzoic acid, 3,5-bis[(2-ethylhexyl)oxy]-, [5-[2-[4-cyano-5-(dicyanomethylene)-2,5-dihydro-2,2-dimethyl-3-furanyl]ethenyl]-2-[4-[4-(dibutylamino)phenyl]-1,3-butadienyl]-3-thienyl]methyl ester (9CI) (CA INDEX NAME)

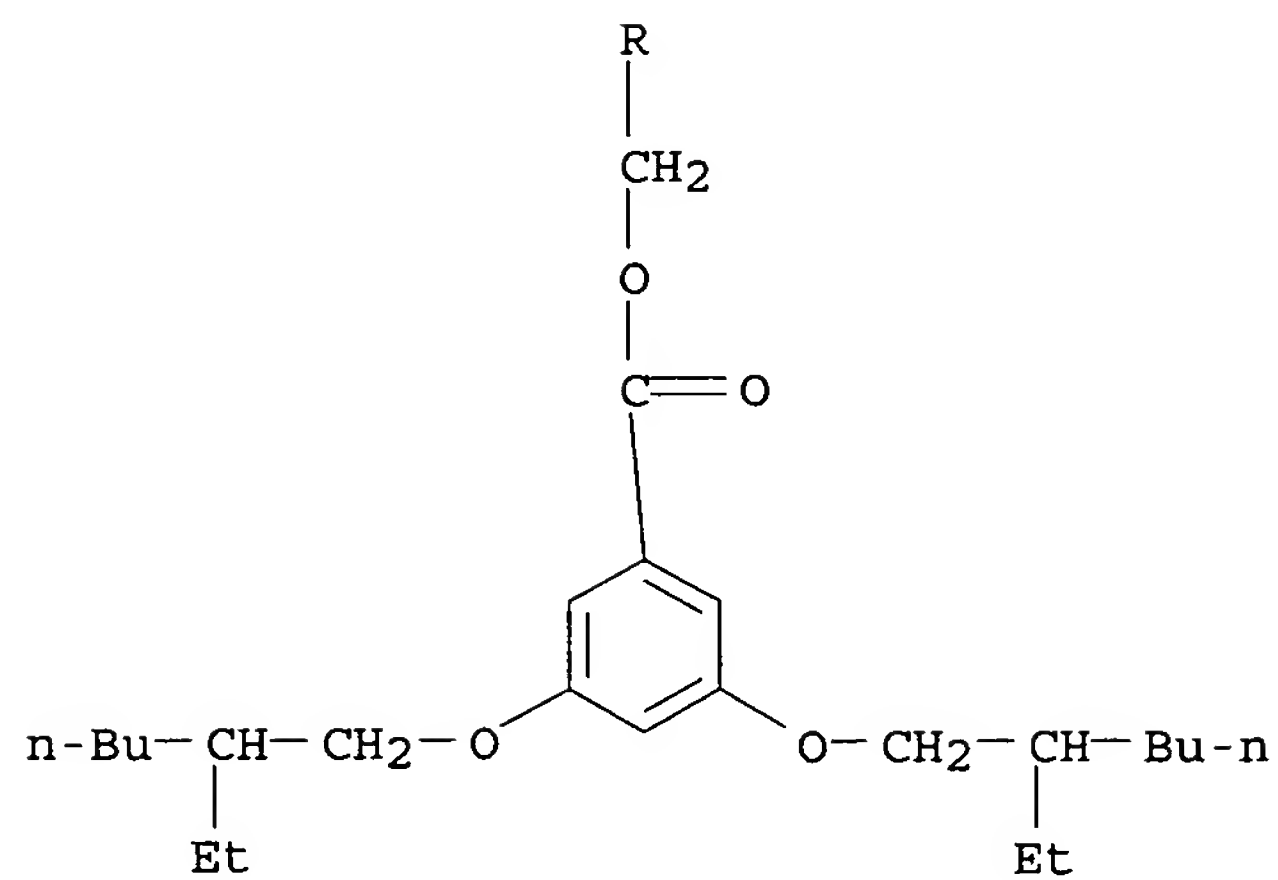
PAGE 1-A



PAGE 2-A



PAGE 3-A





REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 78 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2002:17434 HCAPLUS  
 DOCUMENT NUMBER: 137:7001  
 TITLE: Compact EO polymer vibration sensors utilizing various planar and hybrid fiber/waveguide architectures  
 AUTHOR(S): Yacoubian, Araz  
 CORPORATE SOURCE: IPITEK, Carlsbad, CA, 92008, USA  
 SOURCE: Polymer News (2001), 26(12), 408-415  
 CODEN: PLYNBU; ISSN: 0032-3918  
 PUBLISHER: Gordon & Breach Science Publishers  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB The use of electro-optic (EO) polymers for high frequency vibration sensing applications is explored. This paper presents four integrated optics-based sensor architectures designed to perform acoustic spectrum anal. These devices utilize EO polymer materials traditionally used for communication applications, whereas here they are used to perform heterodyning to down-convert high frequency (GHz) vibrations to lower frequencies and utilize low-frequency photo detectors. In conjunction with a pulsed laser, the sensors are capable of interrogating sub-surface structures of thin films and opaque materials at micron and sub-micron depth resolution. To make a practical device requires addressing loss, size, mech. and thermal fluctuation tolerance, and ease of fabrication issues. Therefore, four different architectures are implemented and compared. The implemented devices consist of planar waveguide and fiber structures utilizing ridge, slab mode, hybrid ridge/slab mode, and hybrid fiber/waveguide architectures. Performances of all four devices are compared, and the best architecture is chosen. Low-frequency expts. illustrate the proof of concept, while high frequency expts. (measured up to 200 MHz) illustrate the sensing of vibration excited by a pulsed Nd-YAG laser. Application of the technol. for different industries is discussed.

IT 432555-91-4

RL: DEV (Device component use); PRP (Properties); USES (Uses)  
 (compact electro optic polymer vibration sensors utilizing various planar and hybrid fiber/waveguide architectures)

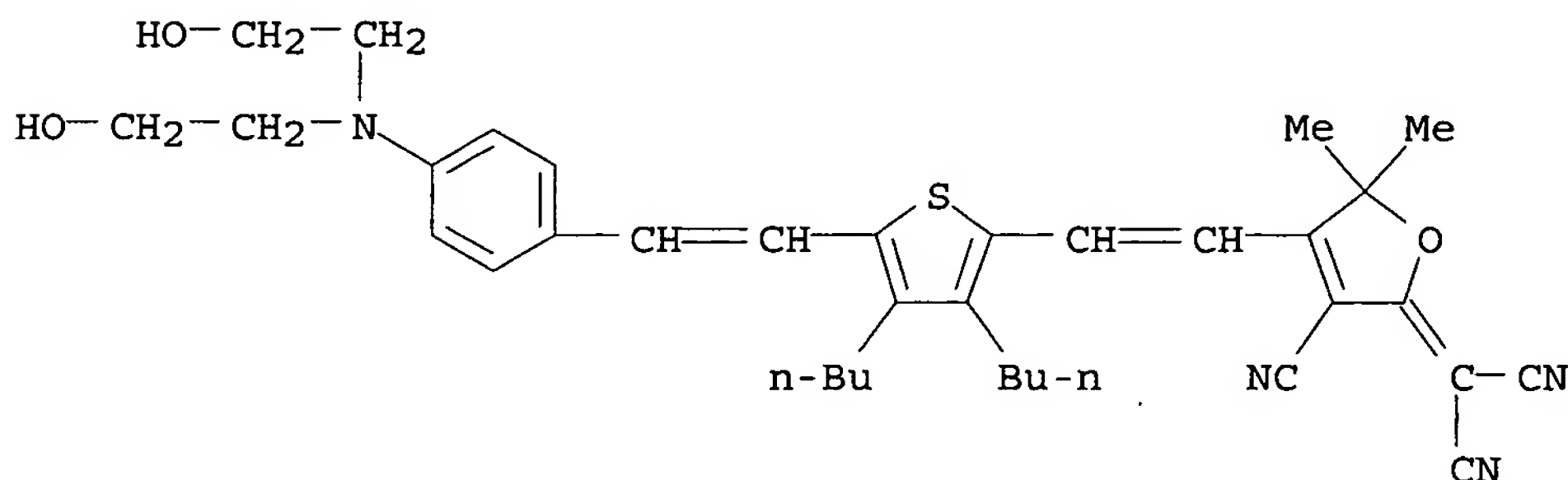
RN 432555-91-4 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]-, homopolymer (9CI) (CA INDEX NAME)

CM 1

CRN 224746-62-7

CMF C36 H42 N4 O3 S



REFERENCE COUNT: 22 THERE ARE 22 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 79 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2001:935613 HCAPLUS  
 DOCUMENT NUMBER: 136:55226  
 TITLE: Chromophores, their production and their use for  
 polymeric thin films and optical waveguides  
 INVENTOR(S): He, Mingqian; Leslie, Thomas M.  
 PATENT ASSIGNEE(S): Corning Incorporated, USA  
 SOURCE: PCT Int. Appl., 48 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 2  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001098310	A1	20011227	WO 2001-US15827	20010516
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
US 6584266	B1	20030624	US 2000-595221	20000616
US 6393190	B1	20020521	US 2000-675966	20000929
CA 2411963	AA	20011227	CA 2001-2411963	20010516
EP 1290000	A1	20030312	EP 2001-937449	20010516
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
JP 2004501159	T2	20040115	JP 2002-504265	20010516
PRIORITY APPLN. INFO.:			US 2000-595221	A 20000616
			US 2000-675966	A 20000929
			WO 2001-US15827	W 20010516

OTHER SOURCE(S): CASREACT 136:55226; MARPAT 136:55226

AB The present invention is directed to chromophores having novel electron-withdrawing groups and novel bivalent cyclic bridges and to optical waveguides and optical devices having polymeric thin films which contain the novel chromophores. An example was given for the production of the bis(hydroxyethyl)amino derivative of a conjugated chromophore containing thiophene and dihydrofuran rings; this compound was copolymd. with a chlorinated norbornenedicarboxylic acid derivative and a chlorinated xylylenediol to provide an electrooptical polyester.

IT 383124-85-4P

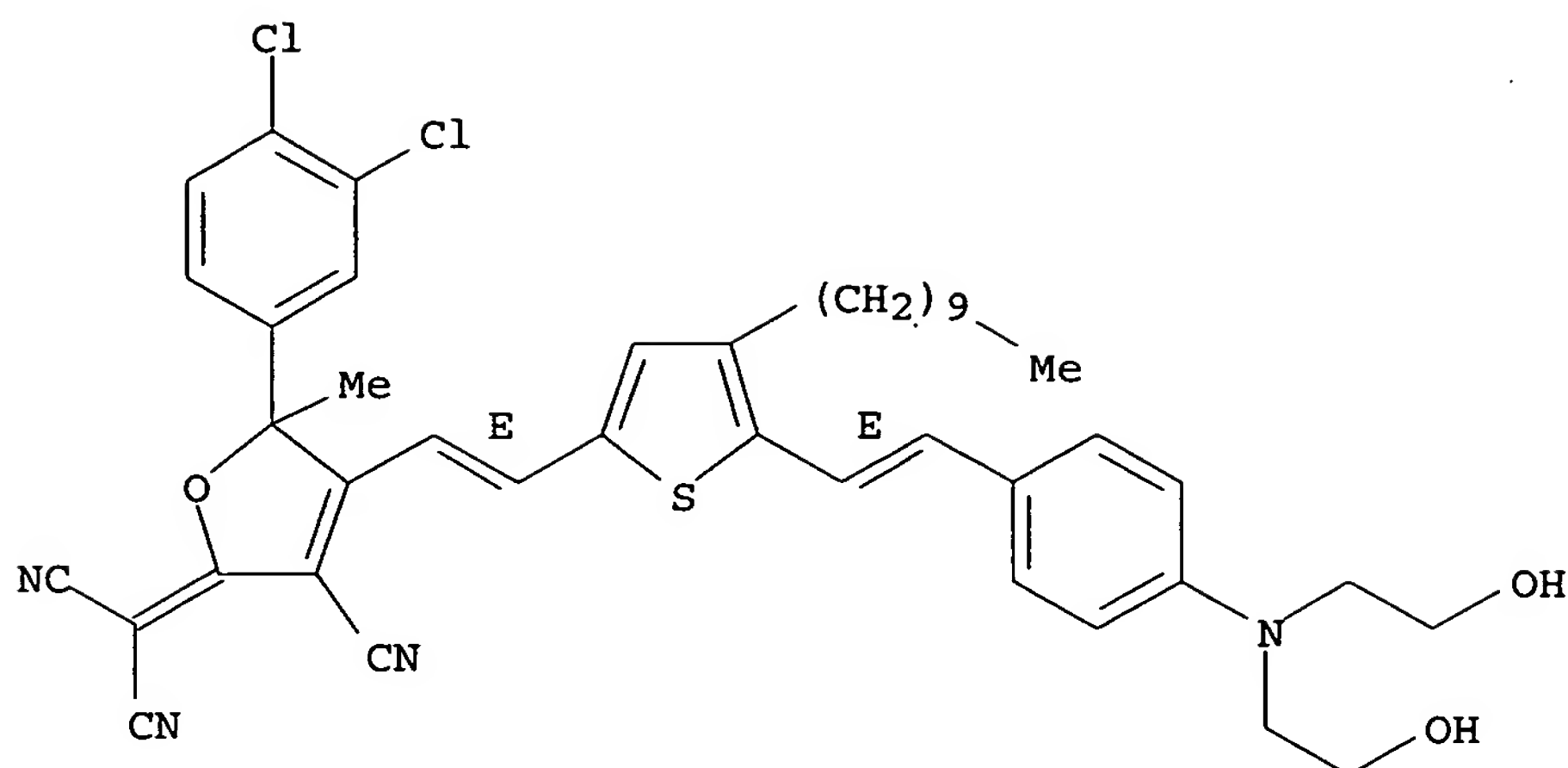
RL: IMF (Industrial manufacture); RCT (Reactant); TEM (Technical or engineered material use); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)

(monomer chromophore; production of intermediates for electrooptical chromophores)

RN 383124-85-4 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-4-decyl-2-thienyl]ethenyl]-3-cyano-5-(3,4-dichlorophenyl)-5-methyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



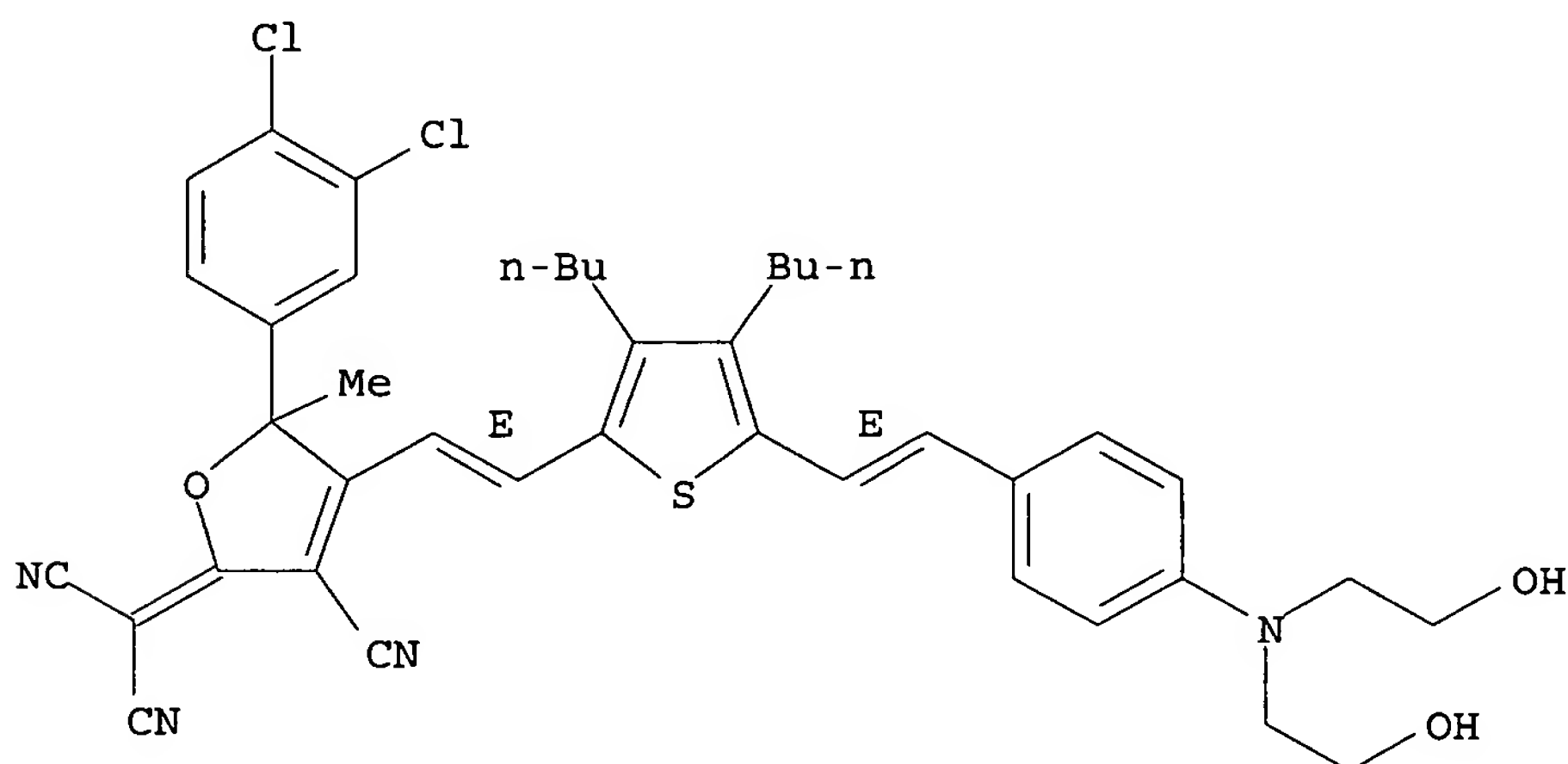
IT 383124-86-5P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)  
(monomeric chromophore; production of intermediates for electrooptical chromophores)

RN 383124-86-5 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5-(3,4-dichlorophenyl)-5-methyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

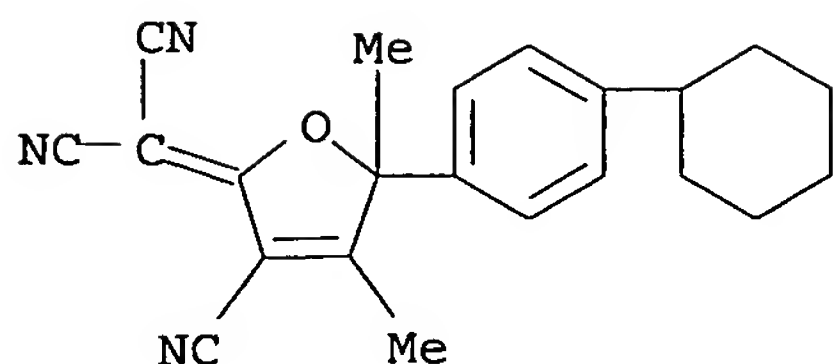


IT 383124-80-9P 383124-88-7P 383124-89-8P

RL: IMF (Industrial manufacture); PREP (Preparation)  
(production of intermediates for electrooptical chromophores)

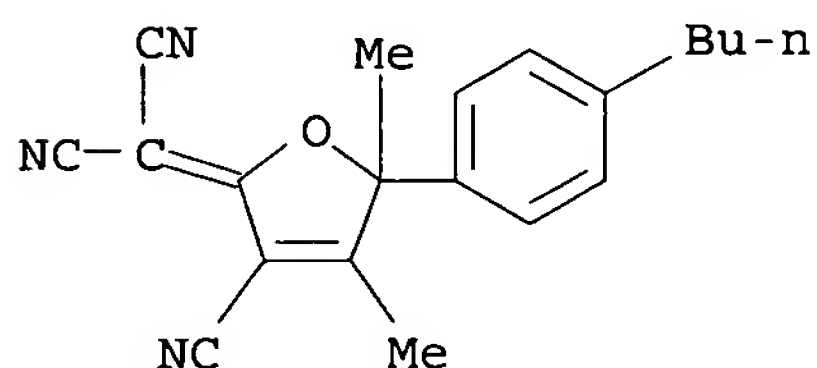
RN 383124-80-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(4-cyclohexylphenyl)-4,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



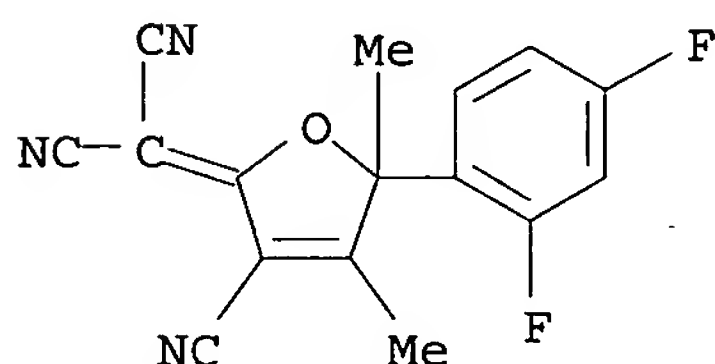
RN 383124-88-7 HCAPLUS

CN Propanedinitrile, [5-(4-butylphenyl)-3-cyano-4,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 383124-89-8 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(2,4-difluorophenyl)-4,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



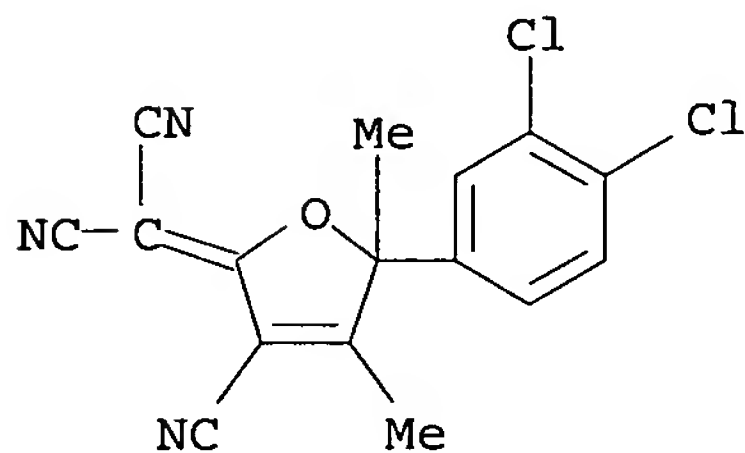
IT 383124-82-1P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT (Reactant or reagent)

(production of intermediates for electrooptical chromophores)

RN 383124-82-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



IT 383124-87-6P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(production of polyesters containing electrooptical chromophores)

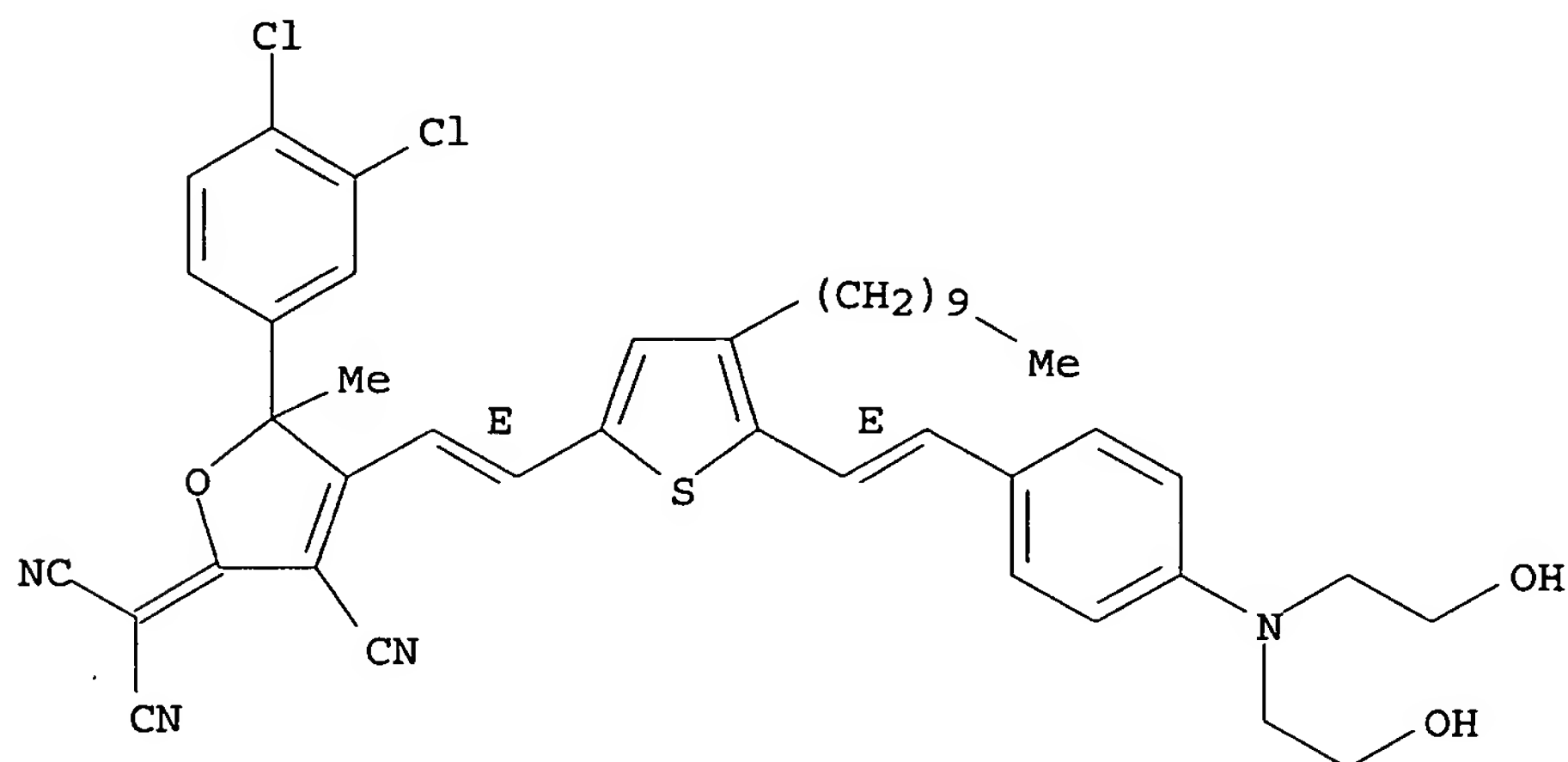
RN 383124-87-6 HCAPLUS  
 CN Bicyclo[2.2.1]hept-5-ene-2,3-dicarbonyl dichloride, 1,4,5,6,7,7-hexachloro-  
 , polymer with [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-  
 hydroxyethyl)amino]phenyl]ethenyl]-4-decyl-2-thienyl]ethenyl]-3-cyano-5-  
 (3,4-dichlorophenyl)-5-methyl-2(5H)-furanylidene]propanedinitrile and  
 2,3,5,6-tetrachloro-1,4-benzenedimethanol (9CI) (CA INDEX NAME)

CM 1

CRN 383124-85-4

CMF C43 H46 Cl2 N4 O3 S

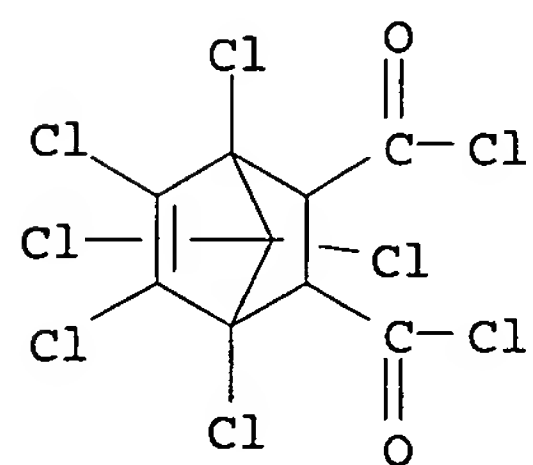
Double bond geometry as shown.



CM 2

CRN 16673-09-9

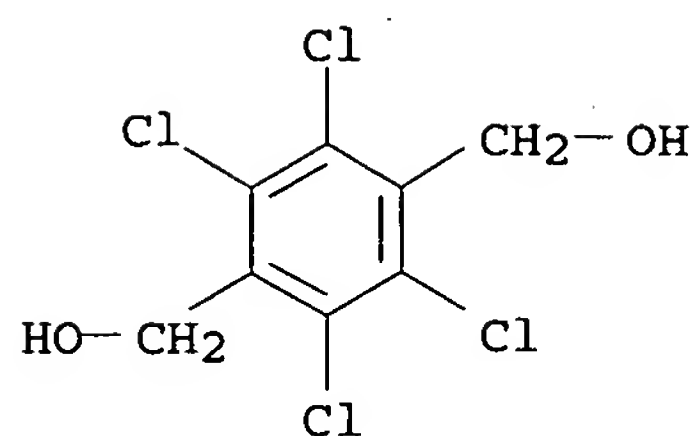
CMF C9 H2 Cl8 O2



CM 3

CRN 7154-26-9

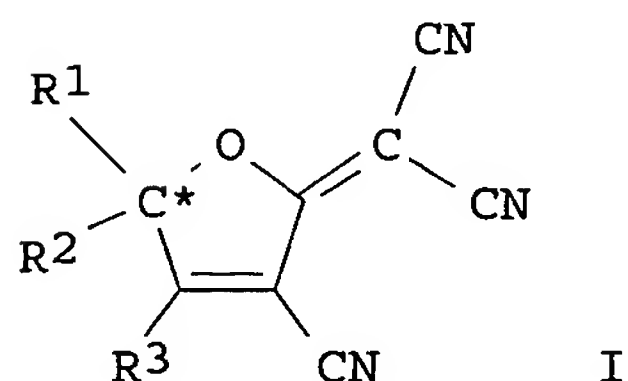
CMF C8 H6 Cl4 O2



REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 80 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2001:935591 HCAPLUS  
 DOCUMENT NUMBER: 136:53676  
 TITLE: Novel electron acceptors for polymeric thin film waveguide media  
 INVENTOR(S): He, Mingqian; Leslie, Thomas M.  
 PATENT ASSIGNEE(S): Corning Incorporated, USA  
 SOURCE: PCT Int. Appl., 22 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 2  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001098287	A1	20011227	WO 2001-US15826	20010516
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR				
US 6448416	B1	20020910	US 2000-596069	20000616
US 6444830	B1	20020903	US 2000-675967	20000929
EP 1289978	A1	20030312	EP 2001-935588	20010516
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR				
PRIORITY APPLN. INFO.:			US 2000-596069	A 20000616
			US 2000-675967	A 20000929
			WO 2001-US15826	W 20010516
OTHER SOURCE(S):			CASREACT 136:53676; MARPAT 136:53676	
GI				



AB Compds. are claimed which are described by the general formula I (R1 = (un)substituted C1-10 alkyl, R2 = (un)substituted C2-10 alkyl, or R1 and R2 = independently selected (un)substituted C4-10 alkenyl, (un)substituted C4-10 alkynyl, (un)substituted aryl, (un)substituted alkylaryl, (un)substituted carbocycles, (un)substituted heterocycles, (un)substituted cyclohexyl, and (CH<sub>2</sub>)<sub>n</sub>-O-(CH<sub>2</sub>)<sub>n</sub>; n = 1-10; or R1 and R2 together form an (un)substituted ring structure, provided there are no methylene between the C\* to which R1 and R2 are bound and an sp<sup>2</sup> or sp hybridized carbon; and R3 = (un)substituted C1-4 alkyl, (un)substituted C1-4 alkenyl, or (un)substituted C1-4 alkynyl). Methods of preparing the compds. are described which entail providing an alkylvinylether; contacting the alkylvinylether with a strong base to form a first intermediate compound; contacting the first intermediate compound with a ketone to form a second intermediate compound; and reacting the second intermediate compound with dicyanomethane in the presence of a second base to form the compound Use in the preparation of polymeric thin films for waveguide media is indicated (no data).

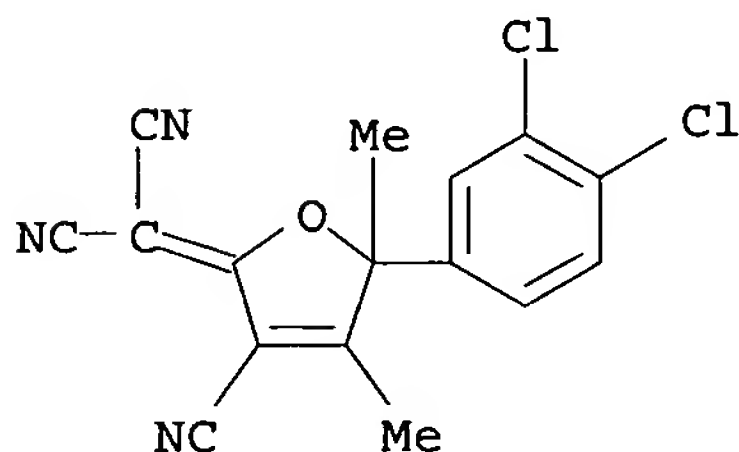
IT 383124-82-1P

RL: IMF (Industrial manufacture); TEM (Technical or engineered material use); PREP (Preparation); USES (Uses)

(dicyanomethylenedihydrofuran derivs. and their preparation)

RN 383124-82-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5-(3,4-dichlorophenyl)-4,5-dimethyl-2(5H)-furanlidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 81 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:928180 HCAPLUS

DOCUMENT NUMBER: 136:223675

TITLE: High-performance photorefractive polymer composite with 2-dicyanomethylen-3-cyano-2,5-dihydrofuran chromophore

AUTHOR(S): Wright, Daniel; Gubler, Ulrich; Roh, Yeonsuk; Moerner, W. E.; He, Meng; Twieg, Robert J.

CORPORATE SOURCE: Department of Chemistry, Stanford University, Stanford, CA, 94305-5080, USA

SOURCE: Applied Physics Letters (2001), 79(26), 4274-4276  
CODEN: APPLAB; ISSN: 0003-6951

PUBLISHER: American Institute of Physics

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A nonlinear optical chromophore for photorefractive applications containing a 2-dicyanomethylen-3-cyano-2,5-dihydrofuran acceptor group is presented. When doped into a plasticized composite of poly(n-vinylcarbazole), large gain coeffs. ( $\Gamma$ ) are observed with photorefractive speed similar to the



best composites reported in the literature while maintaining low sample absorption (.apprx.15 cm-1).

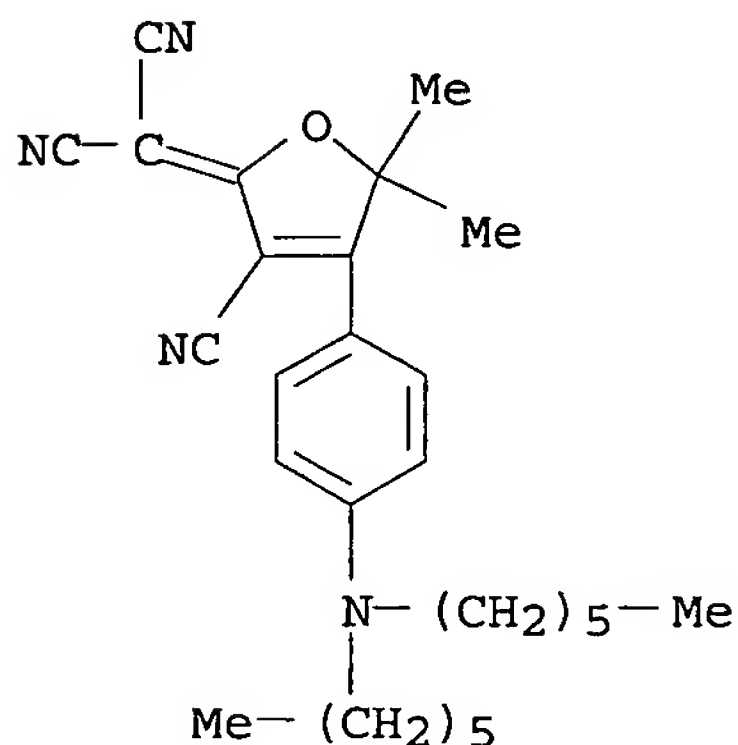
IT 402490-54-4

RL: PRP (Properties)

(high-performance photorefractive polymer composite with  
2-dicyanomethylen-3-cyano-2,5-dihydrofuran chromophore)

RN 402490-54-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[4-(dihexylamino)phenyl]-5,5-dimethyl-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 23 THERE ARE 23 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 82 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:781221 HCAPLUS

DOCUMENT NUMBER: 135:336715

TITLE: Sterically stabilized polyene-bridged second-order  
nonlinear optical chromophores and devices  
incorporating the same

INVENTOR(S): Zhang, Cheng; Fetterman, Harold R.; Steier, William;  
Michael, Joseph

PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA

SOURCE: PCT Int. Appl., 64 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 10

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001079750	A1	20011025	WO 2001-US12354	20010416
W:	AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM			
RW:	GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG			
US 6348992	B1	20020219	US 2000-551685	20000418
PRIORITY APPLN. INFO.:			US 2000-551685	A 20000418



US 1998-122806	A2 19980727
US 2000-488422	A2 20000120
US 2000-546930	A2 20000411

OTHER SOURCE(S): MARPAT 135:336715

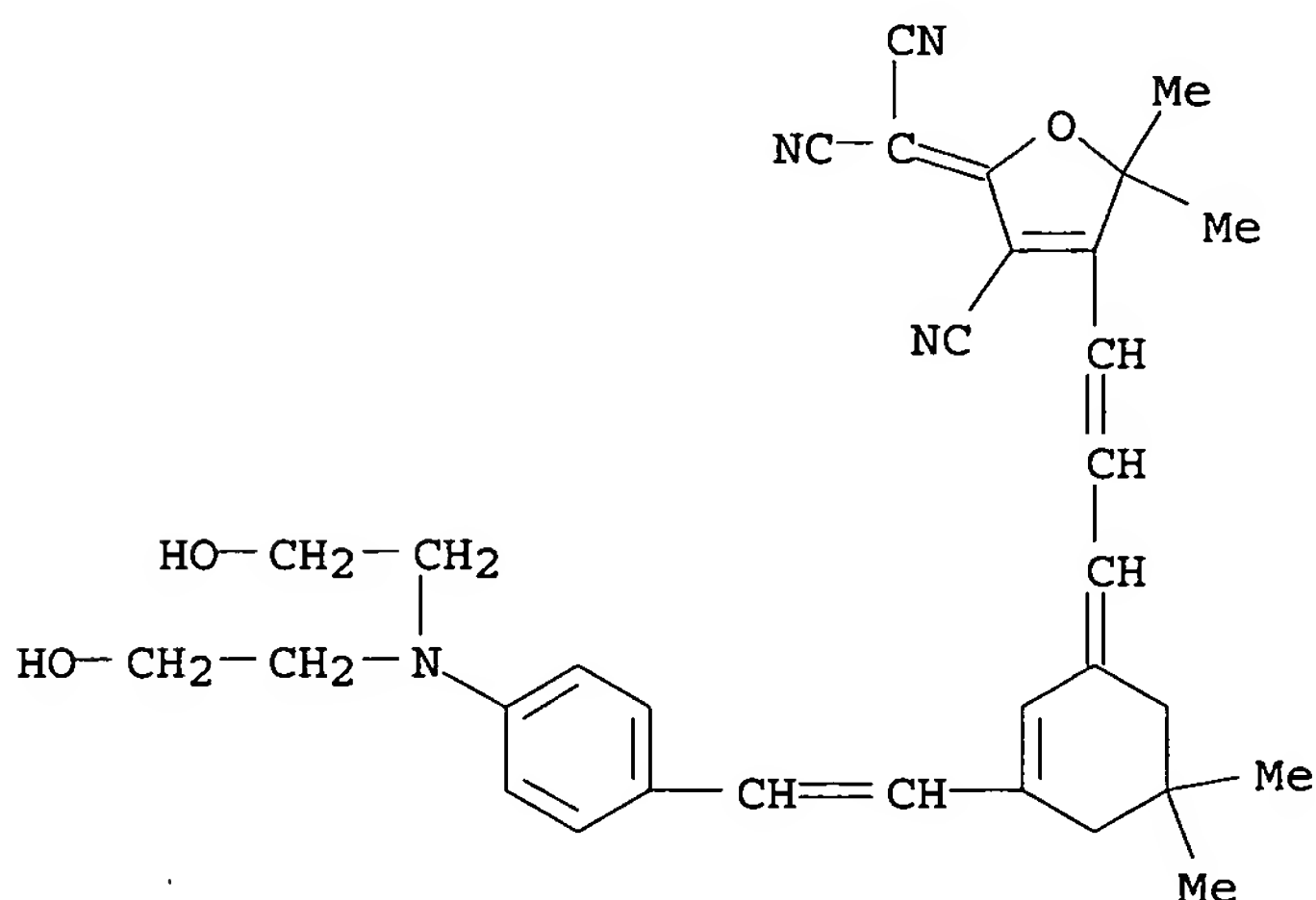
AB Nonlinear optical devices (e.g., electrooptical modulators, phase shifters) are described which employ an active element formed from a chromophore including an electron donor group, an electron acceptor group, and a  $\pi$ -conjugate bridge structure between the electron donor group and the electron acceptor group which includes  $\geq 1$  non-aromatic 5-, 6-, or 7-membered ring which lock(s) one or two carbon-carbon double bond(s) of the conjugate bridge structure and in which the electron acceptor group is connected to the bridge ring structure with a conjugated diene or triene. The bridge may contain a bithiophene unit. The chromophores may be doped into a polymer, preferably a bisphenol A carbonate-4,4'-(3,3,5-trimethylcyclohexylidene)diphenol carbonate copolymer. The devices may be packaged in inert gas filled packages.

IT 224784-30-9 265992-52-7 266348-40-7  
266348-41-8 296280-34-7 351444-91-2  
351444-93-4 351444-95-6 351444-98-9  
351445-03-9 351445-05-1

RL: DEV (Device component use); USES (Uses)  
(nonlinear optical devices employing sterically stabilized  
polyene-bridged second-order nonlinear optical chromophores)

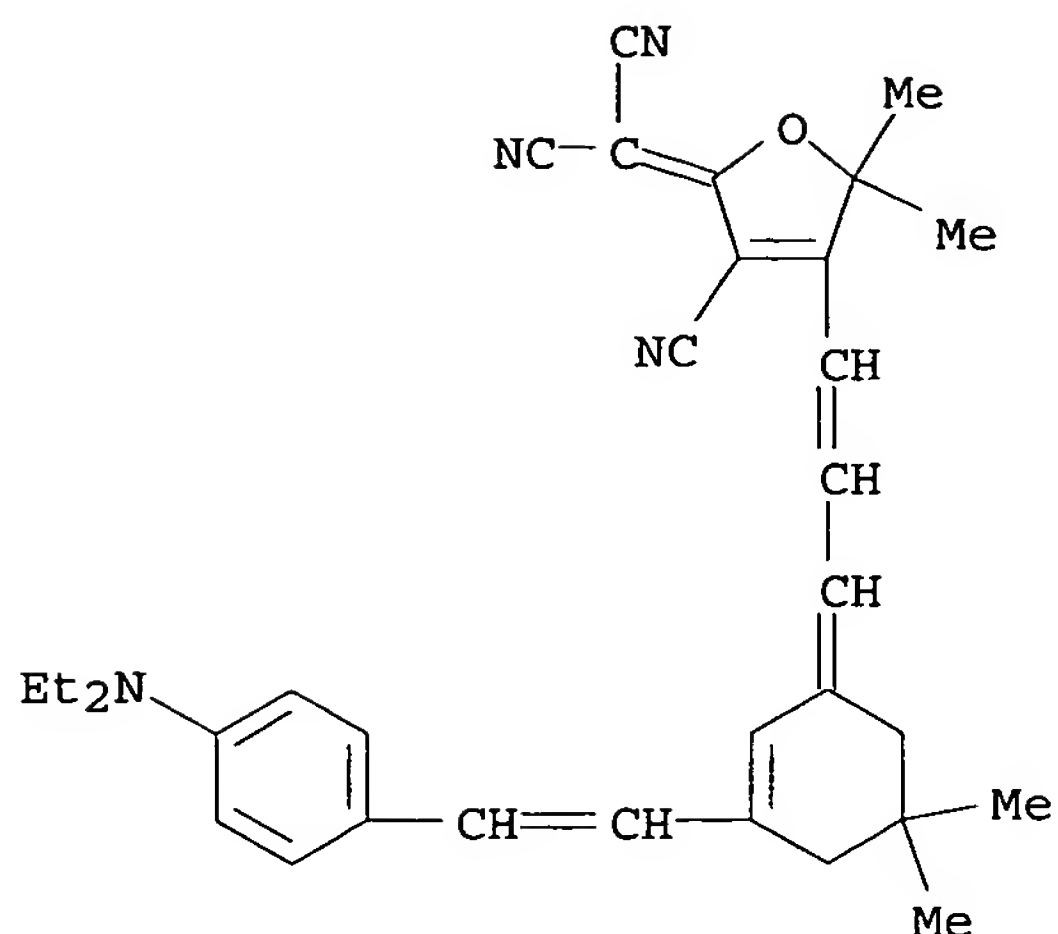
RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



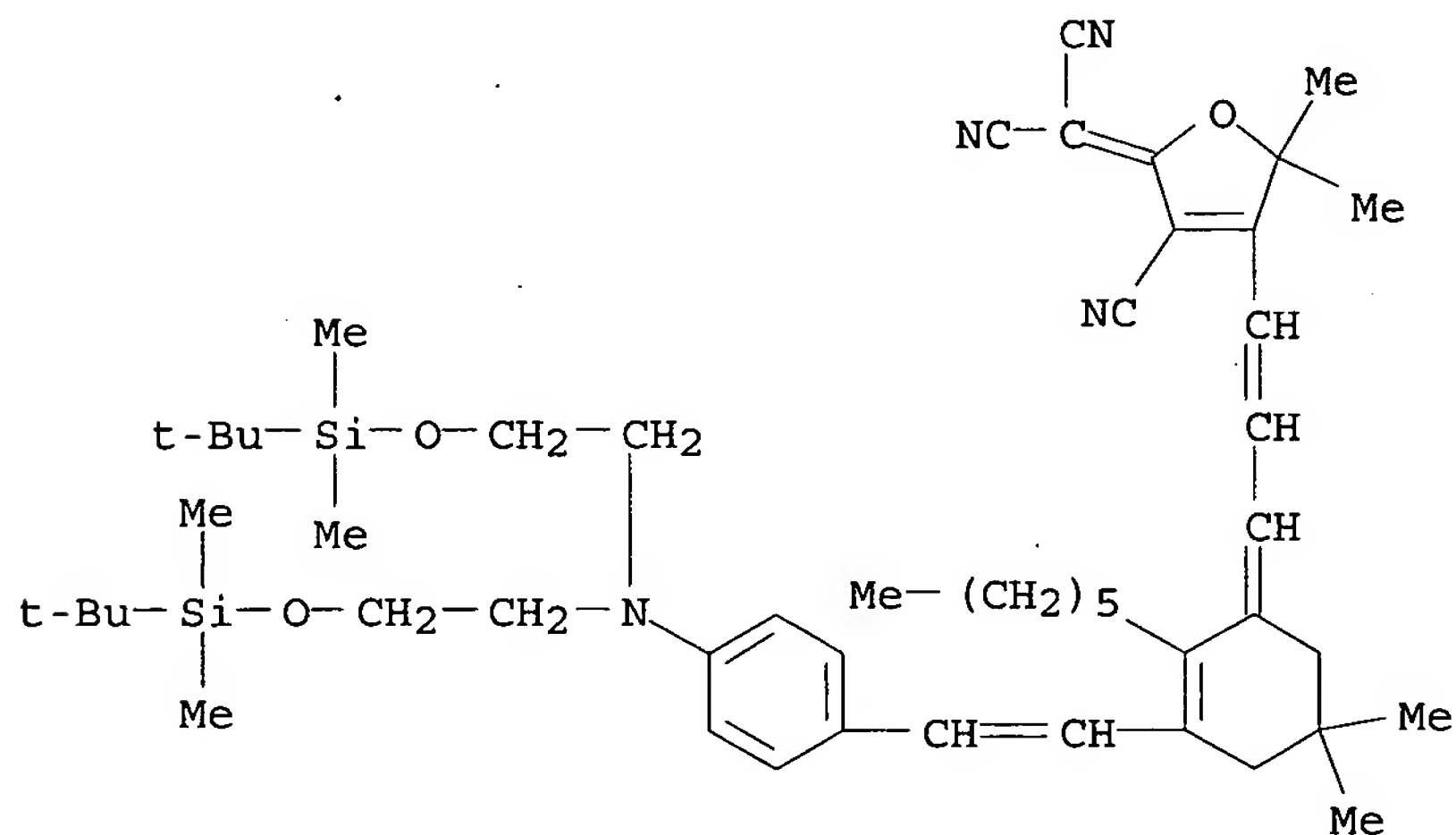
RN 265992-52-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 266348-40-7 HCAPLUS

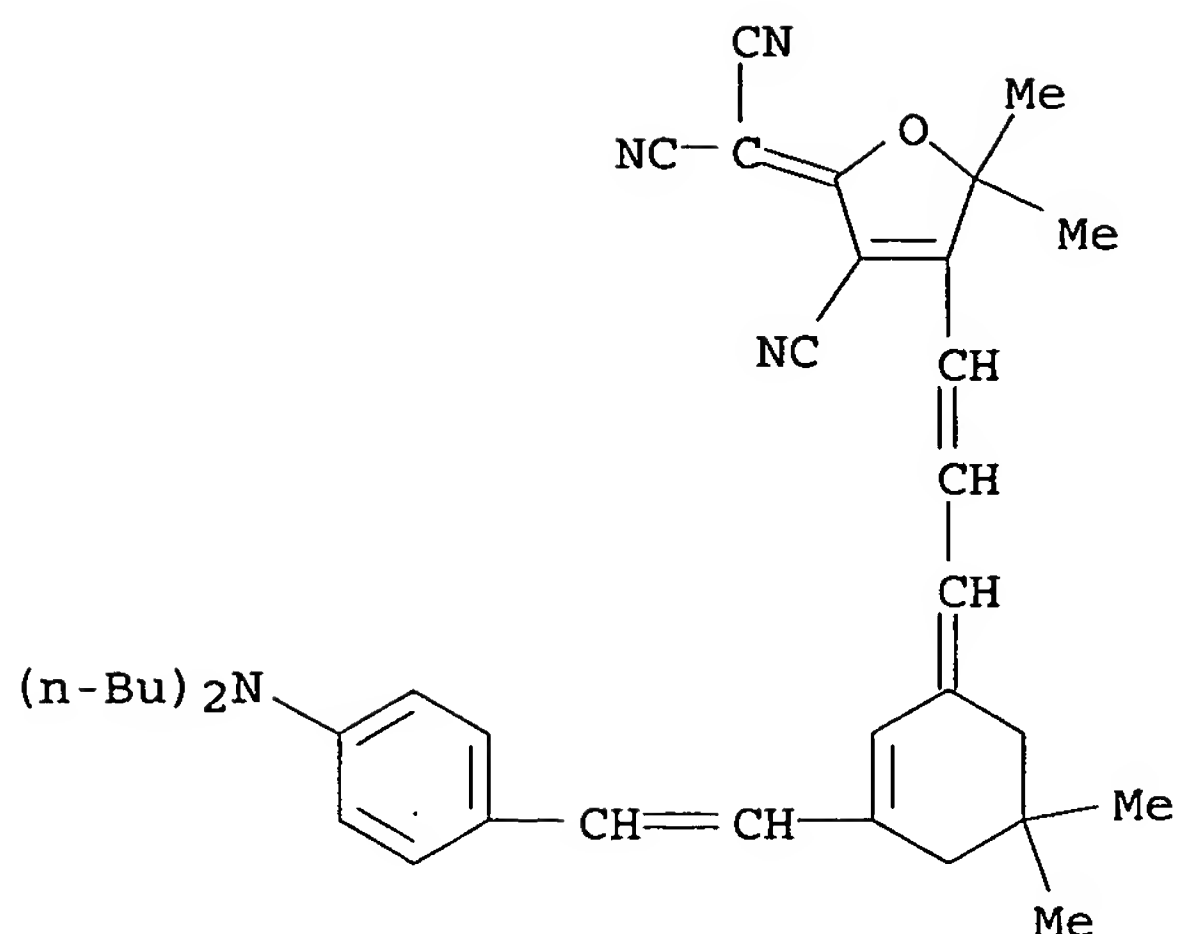
CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



RN 266348-41-8 HCAPLUS

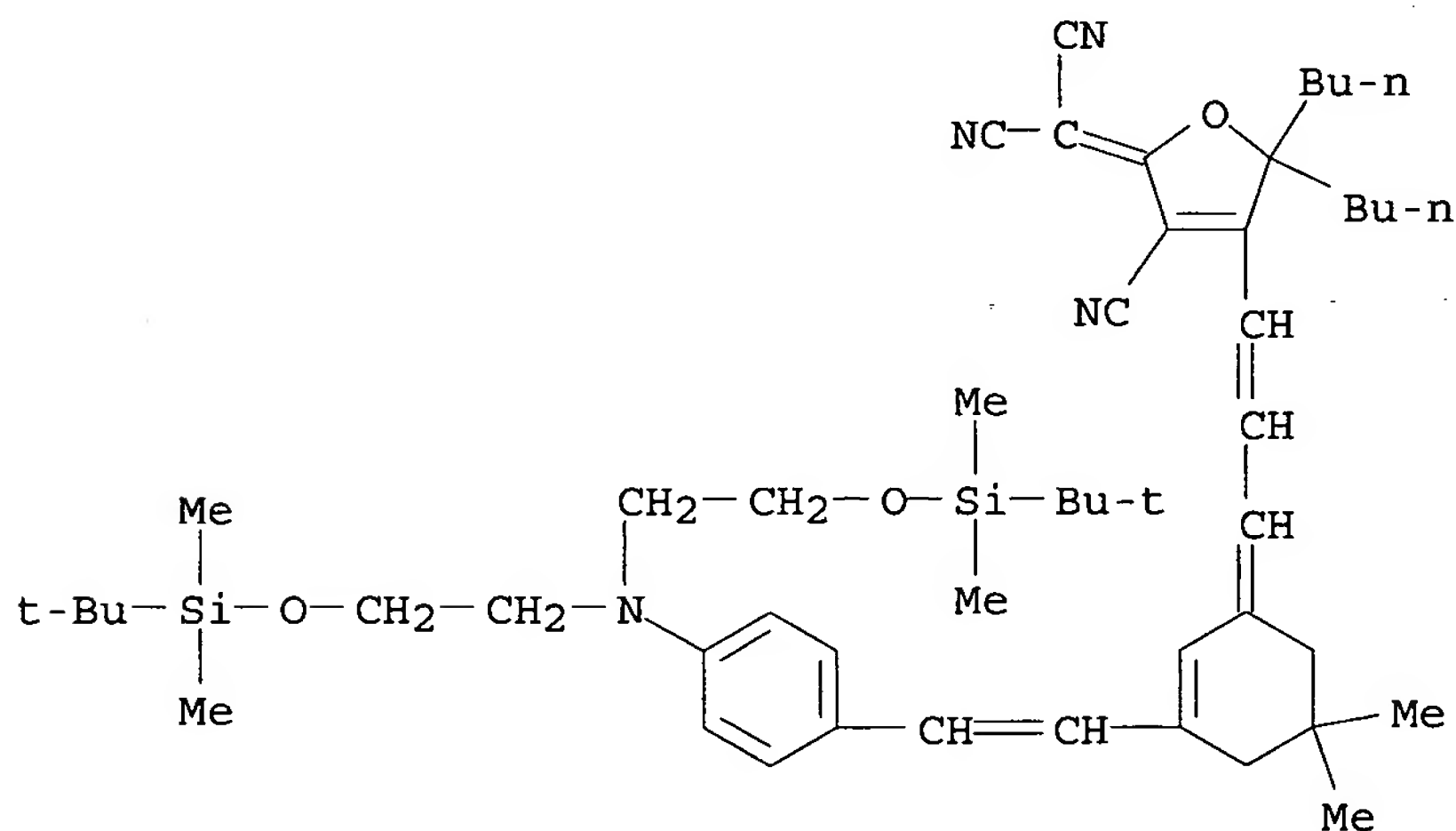
CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)





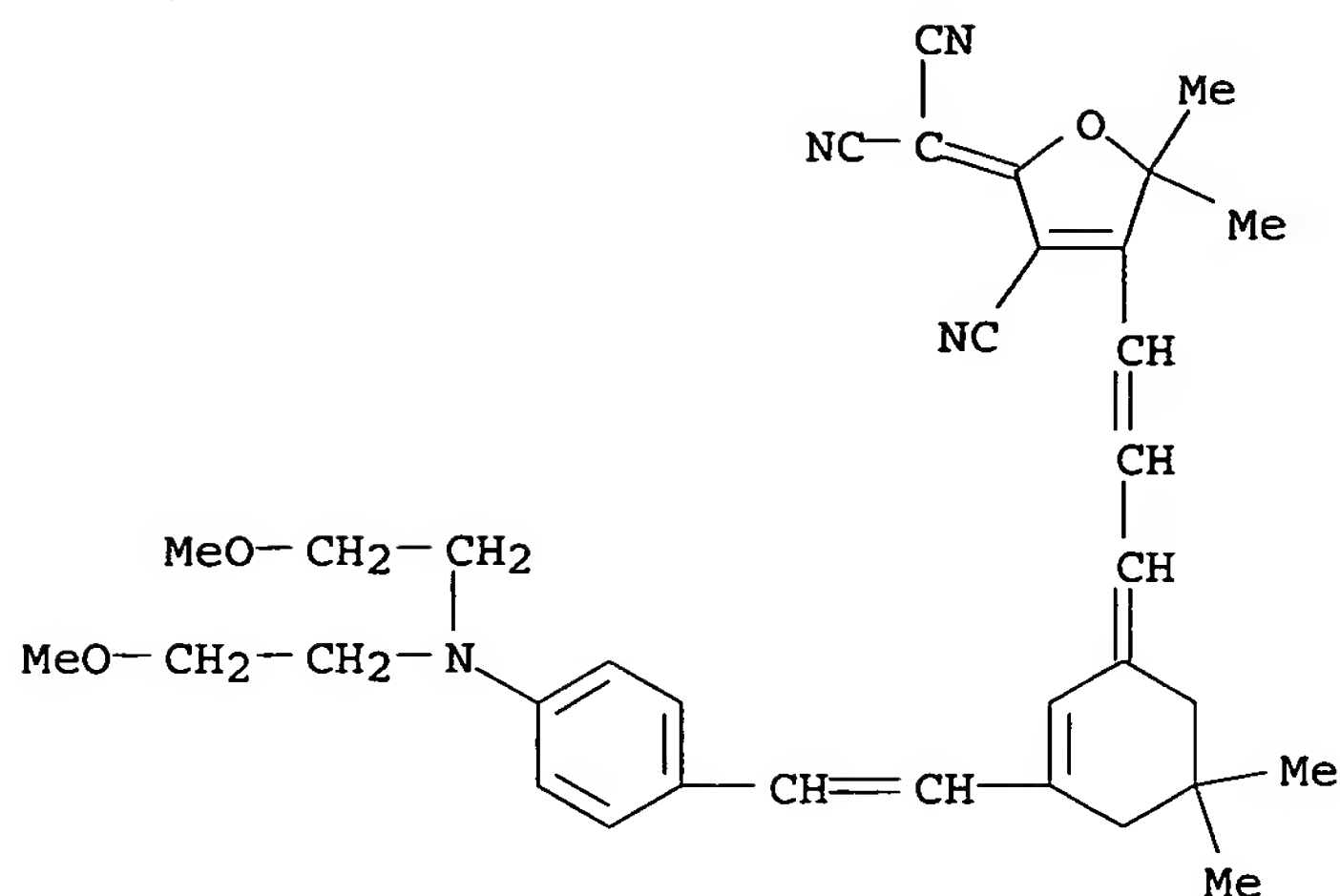
RN 351444-93-4 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



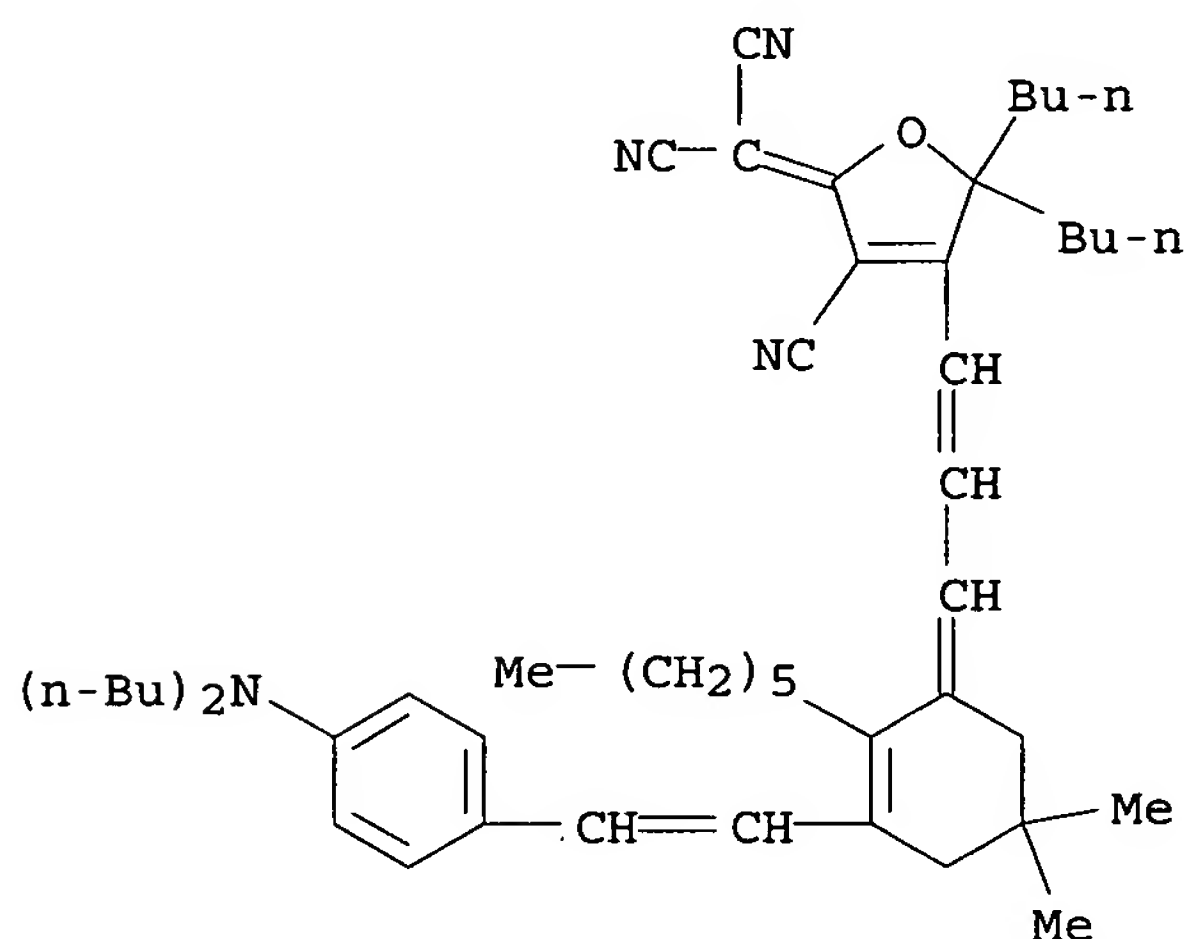
RN 351444-95-6 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



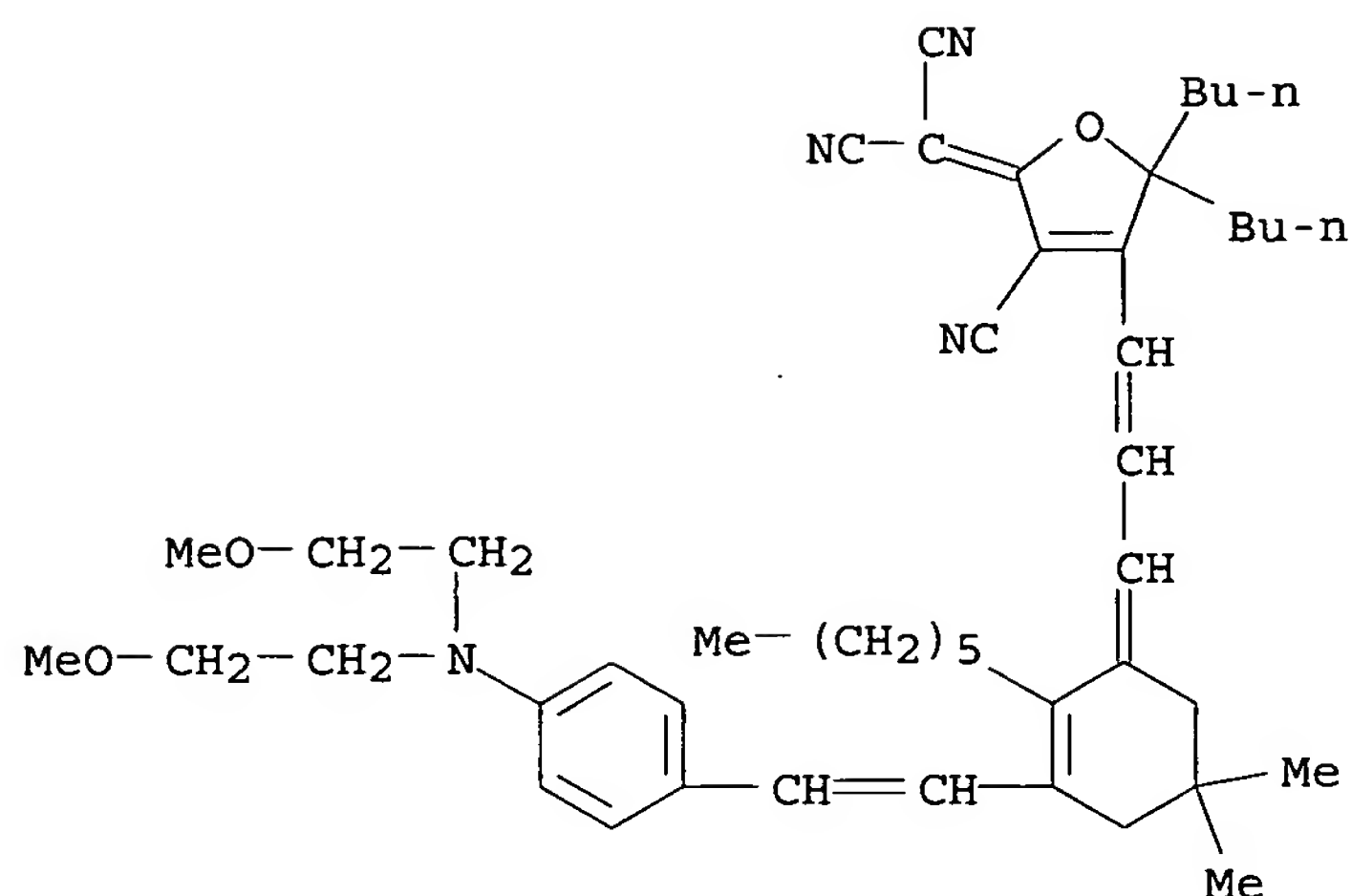
RN 351444-98-9 HCAPLUS

CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[3-[2-[4-(dibutylamino)phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



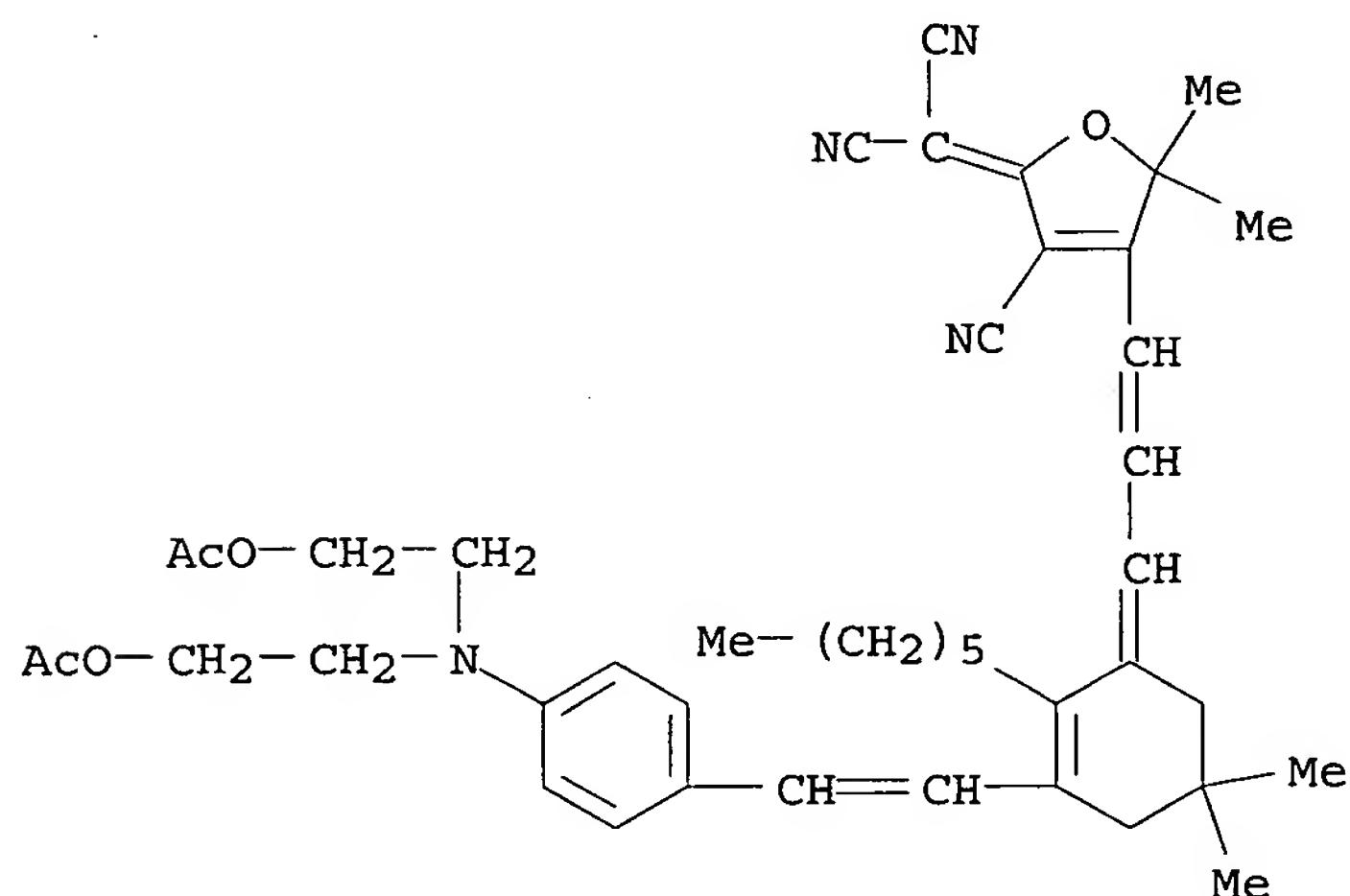
RN 351445-03-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



RN 351445-05-1 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



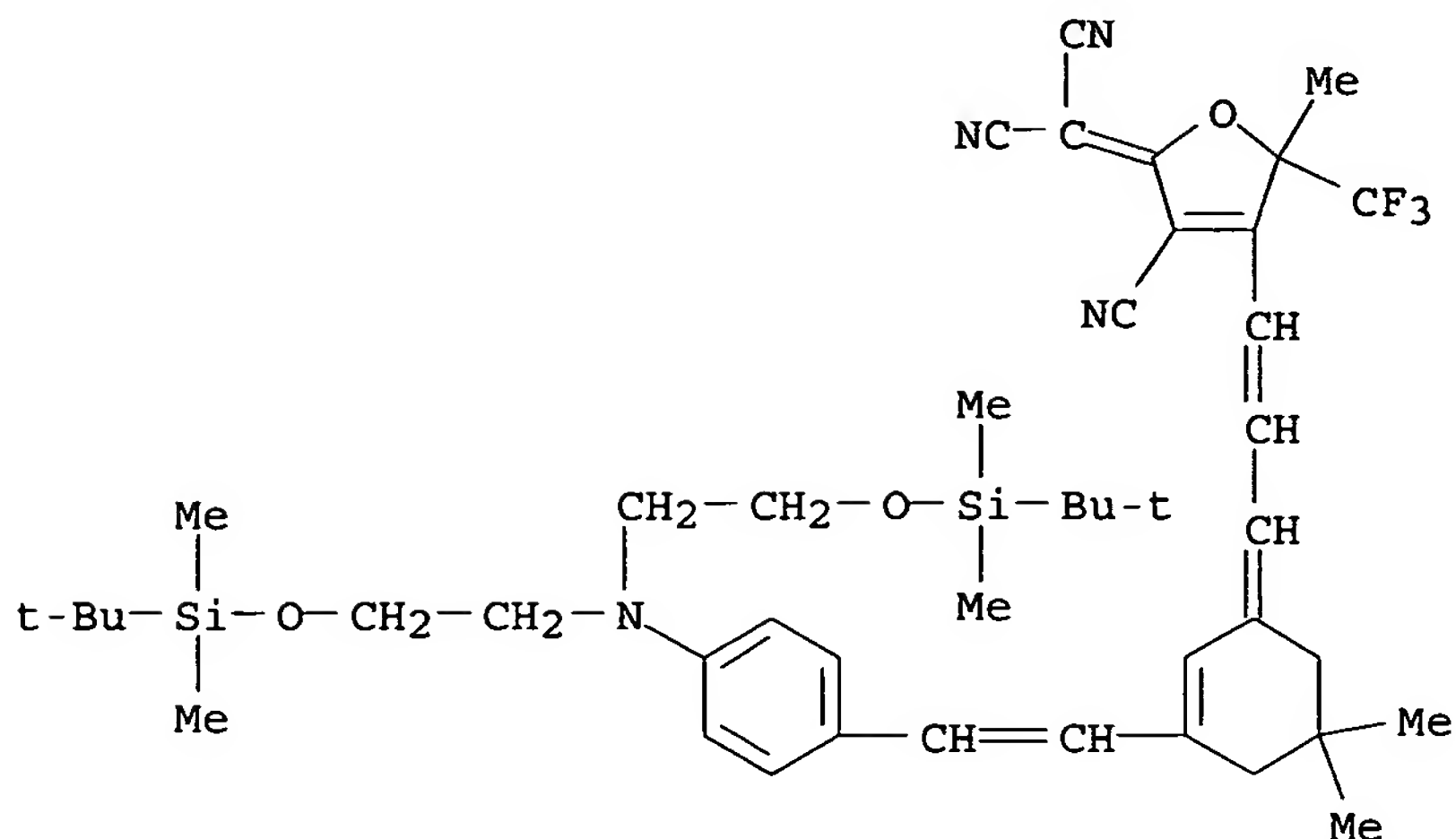
IT 369609-51-8

RL: DEV (Device component use); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)

(nonlinear optical devices employing sterically stabilized polyene-bridged second-order nonlinear optical chromophores)

RN 369609-51-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl]dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5-methyl-5-(trifluoromethyl)-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



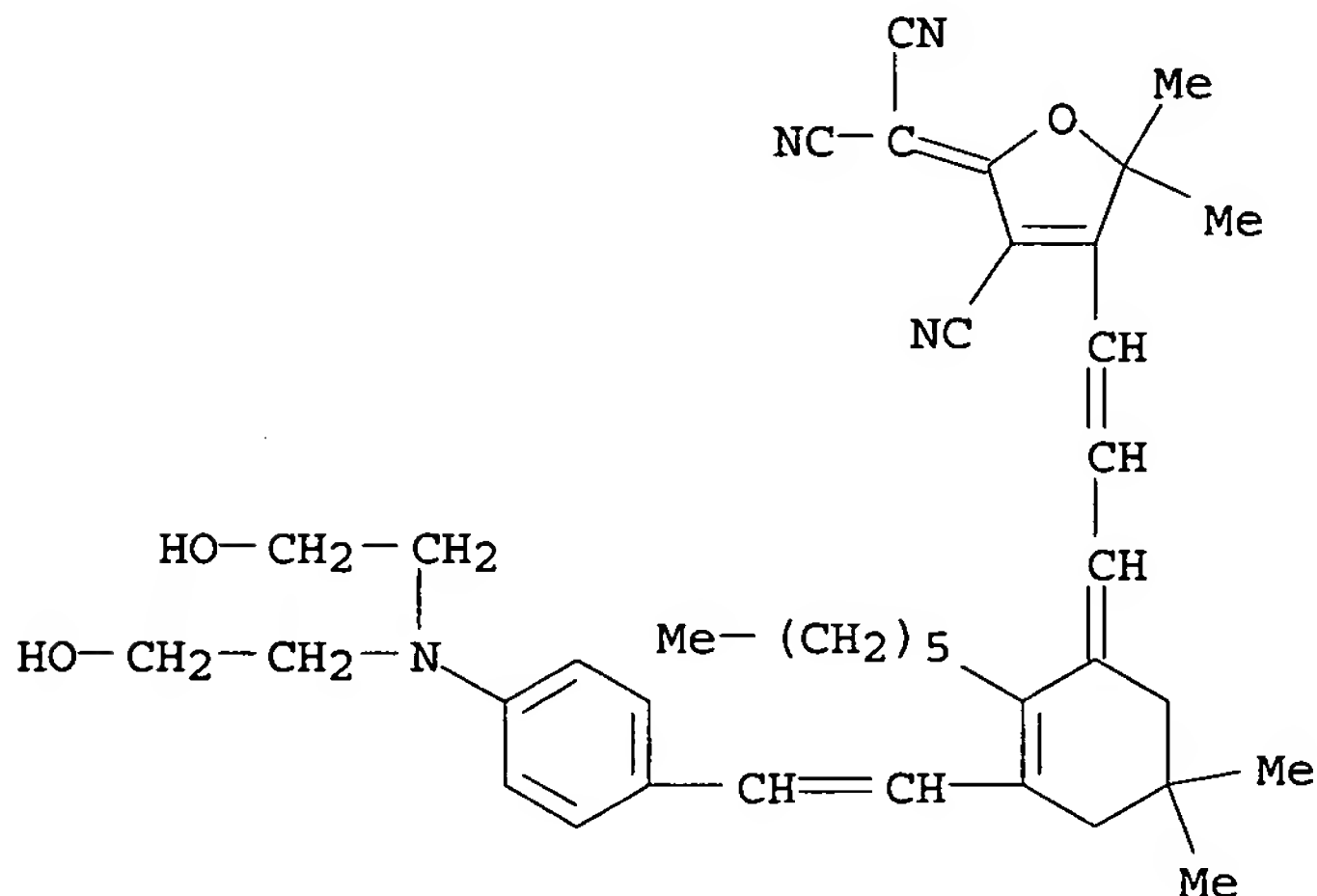
IT 259653-88-8P 369397-06-8P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(nonlinear optical devices employing sterically stabilized polyene-bridged second-order nonlinear optical chromophores)

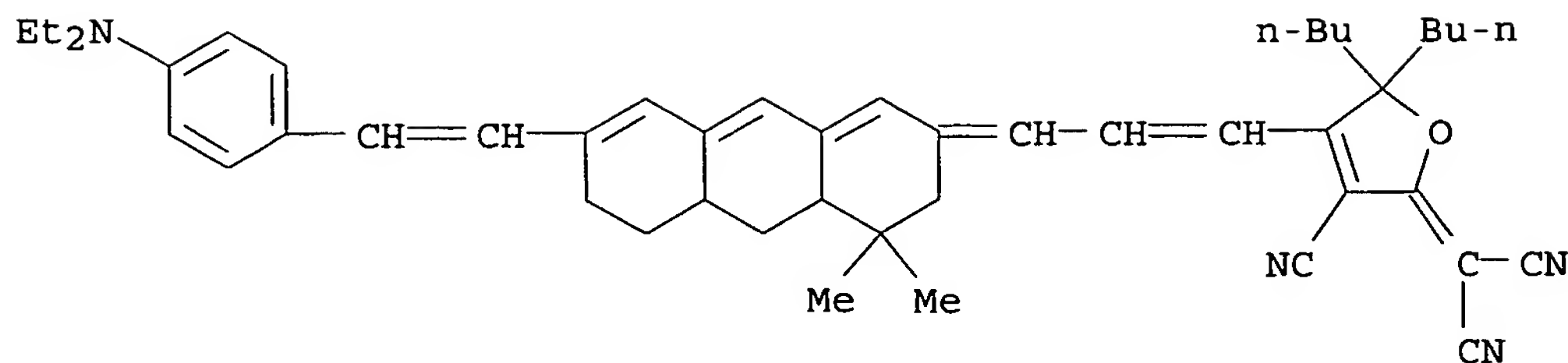
RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



RN 369397-06-8 HCAPLUS

CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[7-[2-[4-(diethylamino)phenyl]ethenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]-1-propenyl]-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



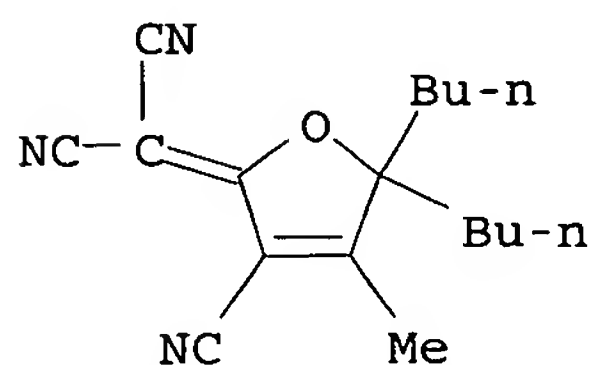
IT 326597-50-6 369609-49-4

RL: RCT (Reactant); RACT (Reactant or reagent)

(nonlinear optical devices employing sterically stabilized  
polyene-bridged second-order nonlinear optical chromophores)

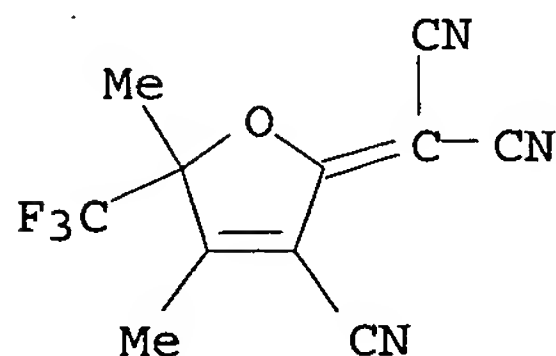
RN 326597-50-6 HCAPLUS

CN Propanedinitrile, (5,5-dibutyl-3-cyano-4-methyl-2(5H)-furanylidene) - (9CI)  
(CA INDEX NAME)



RN 369609-49-4 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(trifluoromethyl)-2(5H)-  
furanylidene] - (9CI) (CA INDEX NAME)



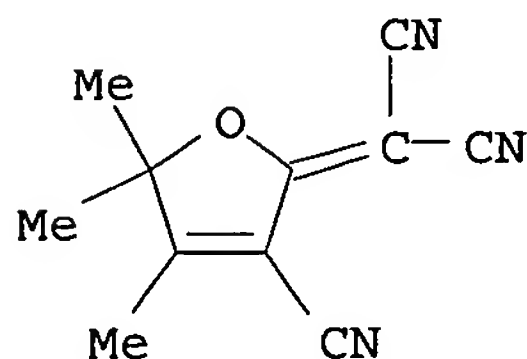
IT 171082-32-9P 369397-36-4P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
(Reactant or reagent)

(nonlinear optical devices employing sterically stabilized  
polyene-bridged second-order nonlinear optical chromophores)

RN 171082-32-9 HCAPLUS

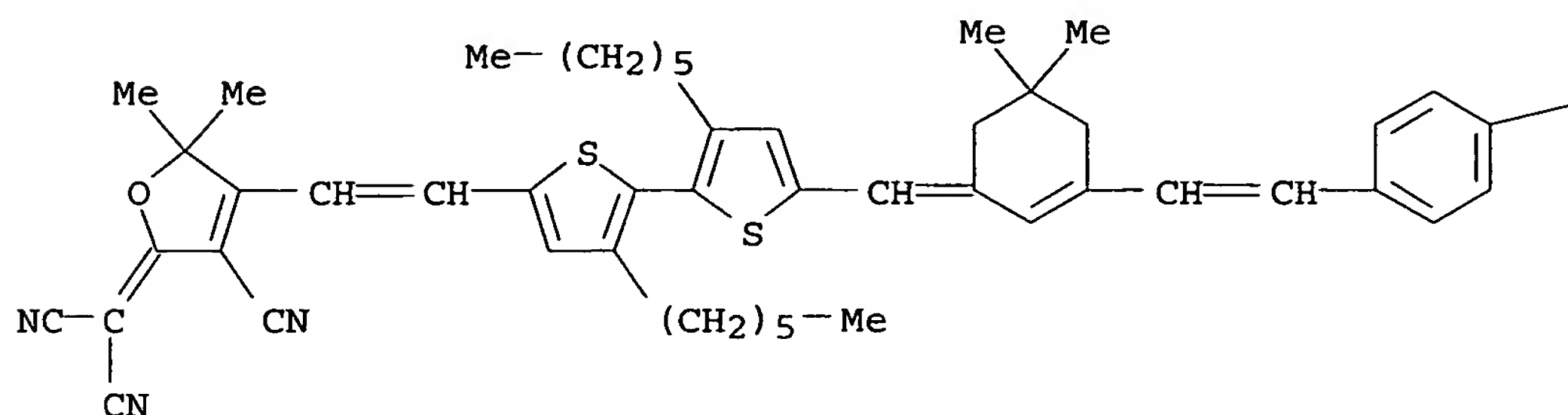
CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA  
INDEX NAME)





RN 369397-36-4 HCAPLUS  
 CN Propanedinitrile, [3-cyano-4-[2-[5'-[[3-[2-[4-(dimethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]methyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-5,5-dimethyl-2(5H)-furanlylidene]-(9CI) (CA INDEX NAME)

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—NMe<sub>2</sub>

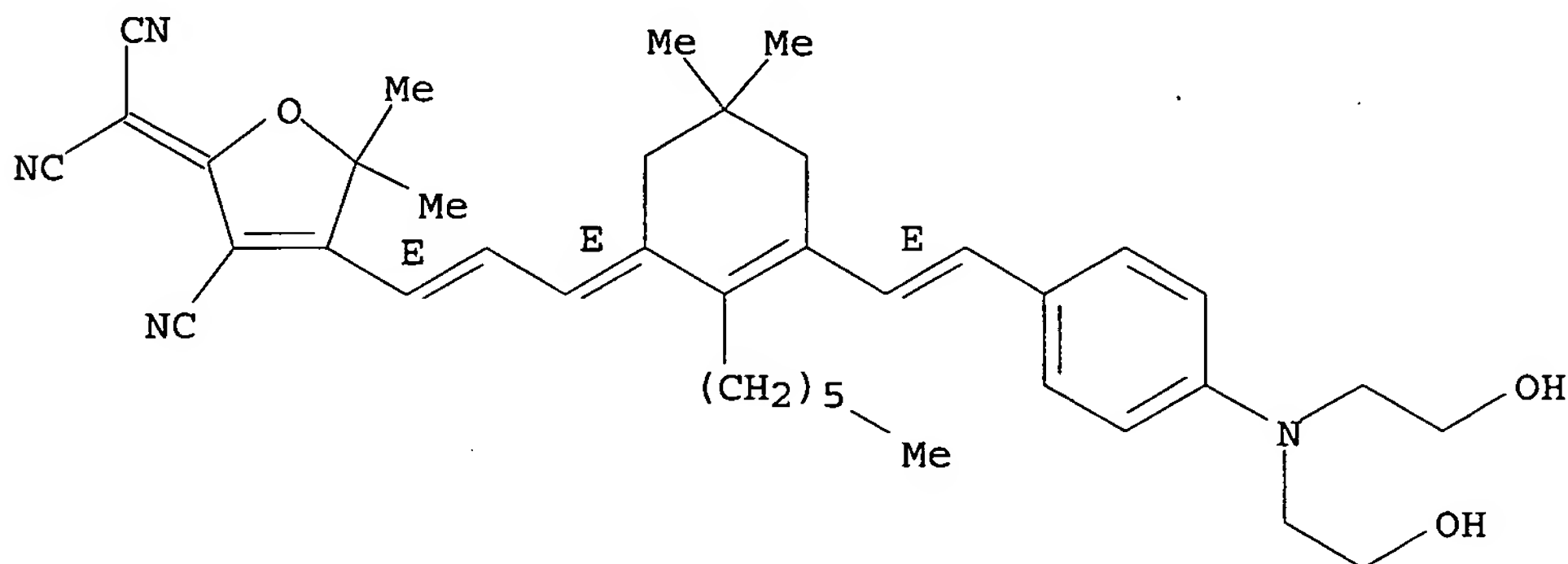
REFERENCE COUNT: 2 THERE ARE 2 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 83 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2001:771228 HCAPLUS  
 DOCUMENT NUMBER: 136:93114  
 TITLE: Polymeric waveguide beam deflector for electro-optic switching  
 AUTHOR(S): Kim, Jin-ha; Sun, Lin; Jang, Chiou-Hung; An, Dechang; Taboada, John Martin; Zhou, Qingjun; Lu, Xuejun; Chen, Ray T.; Li, Bulang; Han, Xinghua; Tang, Suning; Zhang, Hua; Steier, William H.; Ren, Albert; Dalton, Larry R.  
 CORPORATE SOURCE: Microelectronics Research Center, The University of Texas at Austin, TX, 78758, USA  
 SOURCE: Proceedings of SPIE-The International Society for Optical Engineering (2001), 4279(Organic Photonic Materials and Devices III), 37-44  
 CODEN: PSISDG; ISSN: 0277-786X  
 PUBLISHER: SPIE-The International Society for Optical Engineering  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB The authors fabricated and demonstrated a beam deflector implemented in an electrooptic polymer planar waveguide. An array of prism-shaped electrodes formed on the top of the waveguide induces selective refractive index change in the core polymer layer, which results in the tilt of the propagation direction of the guided beam. Waveguide beam deflectors have potential applications in the emerging photonics technologies such as optical storage systems, optical phased array antenna, and optical switching. The deflection sensitivity of 28 mrad/kV, and the maximum deflection angle of  $\pm 8.4$  mrad at  $\pm 300$  V were obtained for this 1st demonstrated device.

IT 224768-41-6D, CLD-5, polyurethanes containing  
 RL: DEV (Device component use); USES (Uses)  
 (polymeric waveguide beam deflector for electro-optic switching)  
 RN 224768-41-6 HCAPLUS  
 CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 84 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2001:763334 HCAPLUS  
 DOCUMENT NUMBER: 135:310664  
 TITLE: Sterically stabilized second-order nonlinear optical chromophores  
 INVENTOR(S): Zhang, Cheng; Fetterman, Harold R.; Steier, William; Michael, Joseph  
 PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA  
 SOURCE: PCT Int. Appl., 50 pp.  
 CODEN: PIXXD2  
 DOCUMENT TYPE: Patent  
 LANGUAGE: English  
 FAMILY ACC. NUM. COUNT: 10  
 PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001077749	A1	20011018	WO 2001-US11613	20010409
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
US 6616865	B1	20030909	US 2000-546930	20000411
PRIORITY APPLN. INFO.:			US 2000-546930	A 20000411
			US 1998-122806	A2 19980727

US 2000-488422

A2 20000120

OTHER SOURCE(S): MARPAT 135:310664

AB Nonlinear optical devices comprising an active element formed from a chromophore including an electron donor group, an electron acceptor group, and a  $\pi$ -conjugate fused-ring bridge structure between the electron donor group and the electron acceptor group are described in which the electron donor group and/or the electron acceptor group (are) is directly connected to the bridge structure or 1 of the electron donor group and the electron acceptor group is connected to the bridge structure with a conjugated diene while the other is directly connected.

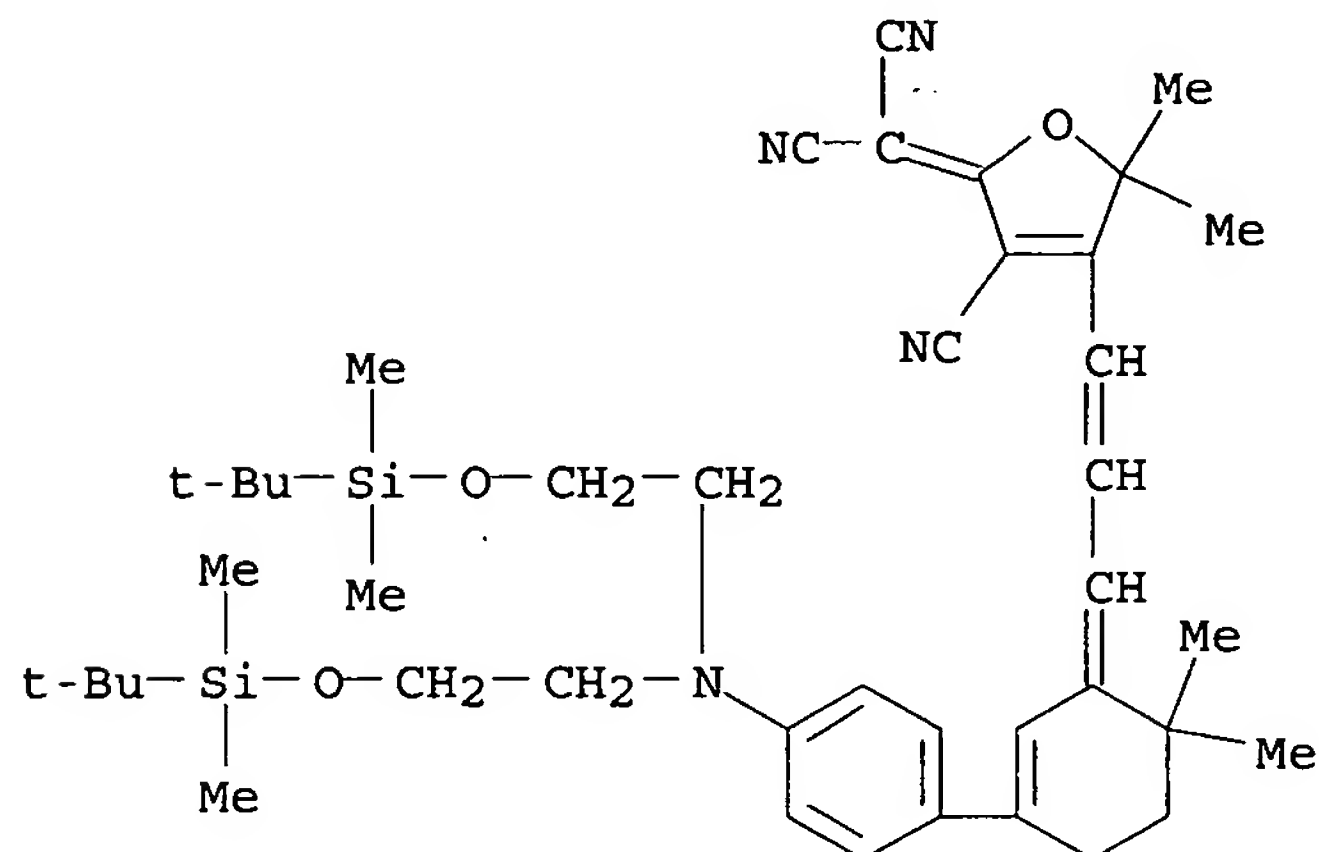
IT 367272-34-2P 367272-38-6P 367272-41-1P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(nonlinear optical devices using sterically stabilized second-order nonlinear optical chromophores)

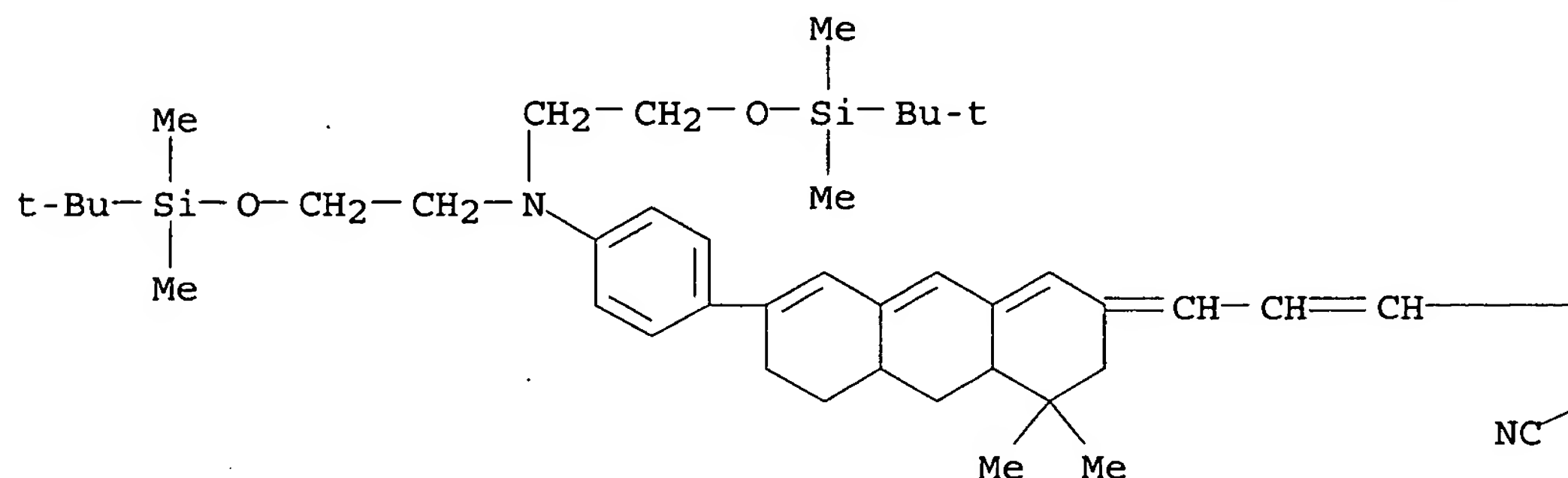
RN 367272-34-2 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]-6,6-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



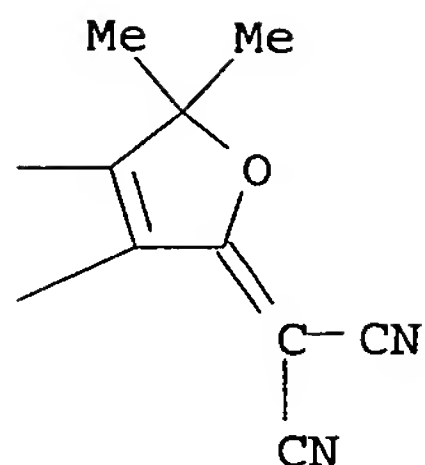
RN 367272-38-6 HCAPLUS

CN Propanedinitrile, [4-[3-[7-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



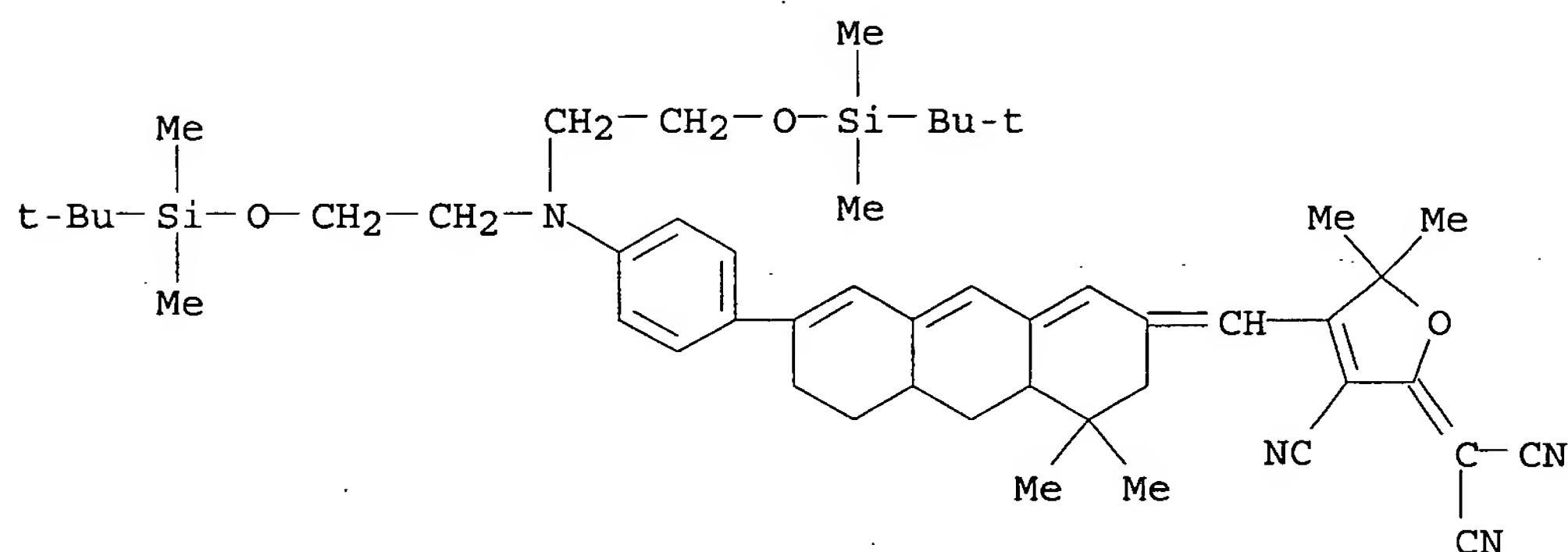
PAGE 1-A

PAGE 1-B



RN 367272-41-1 HCAPLUS

CN Propanedinitrile, [4-[[7-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]-4,4a,5,6,10,10a-hexahydro-4,4-dimethyl-2(3H)-anthracenylidene]methyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI)  
(CA INDEX NAME)



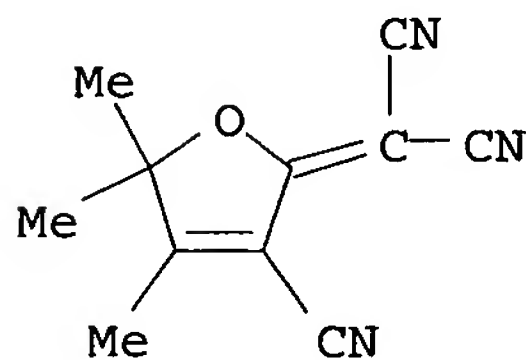
IT 171082-32-9, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran

RL: RCT (Reactant); RACT (Reactant or reagent)

(nonlinear optical devices using sterically stabilized second-order nonlinear optical chromophores)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



L8 ANSWER 85 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
ACCESSION NUMBER: 2001:659304 HCAPLUS  
DOCUMENT NUMBER: 135:350218  
TITLE: Polymeric waveguide prism-based electro-optic beam  
deflector  
AUTHOR(S): Sun, Lin; Kim, Jin-ha; Jang, Chiou-hung; An, Dechang;  
Lu, Xuejun; Zhou, Qingjun; Taboada, John M.; Chen, Ray  
T.; Maki, Jeffery J.; Tang, Suning; Zhang, Hua;  
Steier, William H.; Zhang, Cheng; Dalton, Larry R.  
CORPORATE SOURCE: Microelectronics Research Center, The University of  
Texas at Austin, Austin, TX, 78758, USA  
SOURCE: Optical Engineering (Bellingham, WA, United States)  
(2001), 40(7), 1217-1222  
CODEN: OPEGAR; ISSN: 0091-3286  
PUBLISHER: SPIE-The International Society for Optical Engineering  
DOCUMENT TYPE: Journal  
LANGUAGE: English

IT 224768-41-6, CLD 5  
RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(CLD 5, polyurethane-containing; polymeric waveguide prism-based  
electro-optic beam deflector)

RN	224768-41-6	HCAPLUS
CN	Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)	

CN(CCO)c1ccc(C/C=C/E/C(=C/C=C/E/C(C)C(C)C/C=C/E/C2C(C)(C)OC(C#N)=C(C#N)C2)/cc1

Page 237

L8 ANSWER 86 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:578724 HCAPLUS

DOCUMENT NUMBER: 135:324975

TITLE: Low  $V\pi$  Electrooptic Modulators from CLD-1:  
Chromophore Design and Synthesis, Material Processing,  
and Characterization

AUTHOR(S): Zhang, Cheng; Dalton, Larry R.; Oh, Min-Cheol; Zhang,  
Hua; Steier, William H.

CORPORATE SOURCE: Department of Chemistry and Loker Hydrocarbon Research  
Institute, University of Southern California, Los  
Angeles, CA, 90089-1661, USA

SOURCE: Chemistry of Materials (2001), 13(9), 3043-3050  
CODEN: CMATEX; ISSN: 0897-4756

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A ring-locked, phenyltetraene-based, 2nd-order nonlinear optical  
chromophore (CLD-1) was synthesized. It shows no drop in decomposition  
temperature

compared to its phenyltriene analog, while the mol. nonlinearity increases  
by a factor of 2.25 from  $6252 \pm 10^{-48}$  to  $14065 \pm 10^{-48}$  esu at  
1.9  $\mu\text{m}$ . Thin films and waveguide devices were prepared from CLD-1/PMMA  
and CLD-1/APC (an amorphous polycarbonate) composites to study its  
electrooptic (EO) activity, optical loss, and photostability. An average EO  
coefficient of 92 pm/V at 1.06  $\mu\text{m}$  was achieved in a 25% CLD-1/APC composite.  
Mach-Zender (MZ) modulators fabricated from CLD-1/APC showed good thermal  
stability, low optical loss, low modulation voltage, and high extinction  
ratio. The photochem. stability of the CLD-1/APC modulator can be  
dramatically improved by operating in an inert gas atmosphere. Evidence shows  
that the predominant photochem. degradation mechanism of the material in air  
at 1.55  $\mu\text{m}$  is the reaction between O and photoexcited polyene-based  
chromophores.

IT 368874-13-9P 368874-14-0P

RL: DEV (Device component use); PNU (Preparation, unclassified); PRP  
(Properties); PREP (Preparation); USES (Uses)

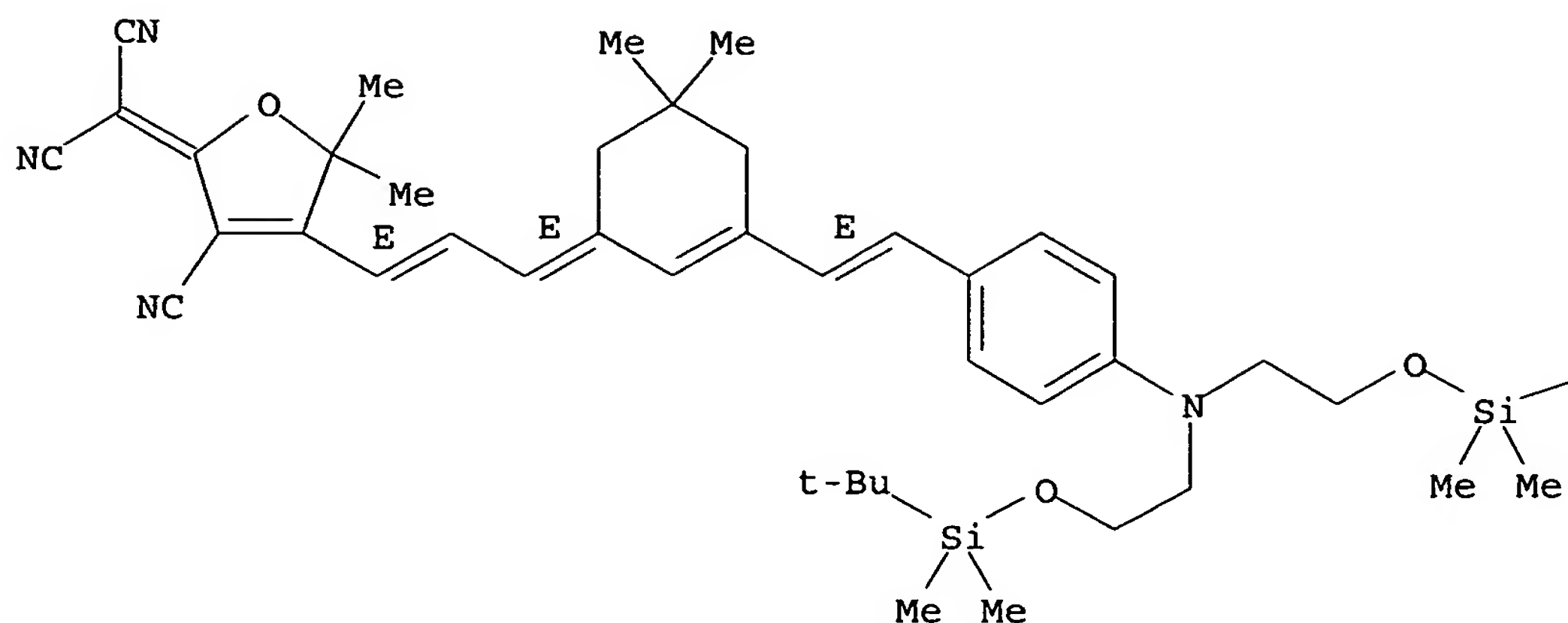
(low  $V\pi$  electrooptic modulators from CLD-1 and chromophore design  
and synthesis, material processing, and characterization)

RN 368874-13-9 HCAPLUS

CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-[bis[2-[[[1,1-  
dimethylethyl]dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-  
cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene]-  
(9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A



PAGE 1-B

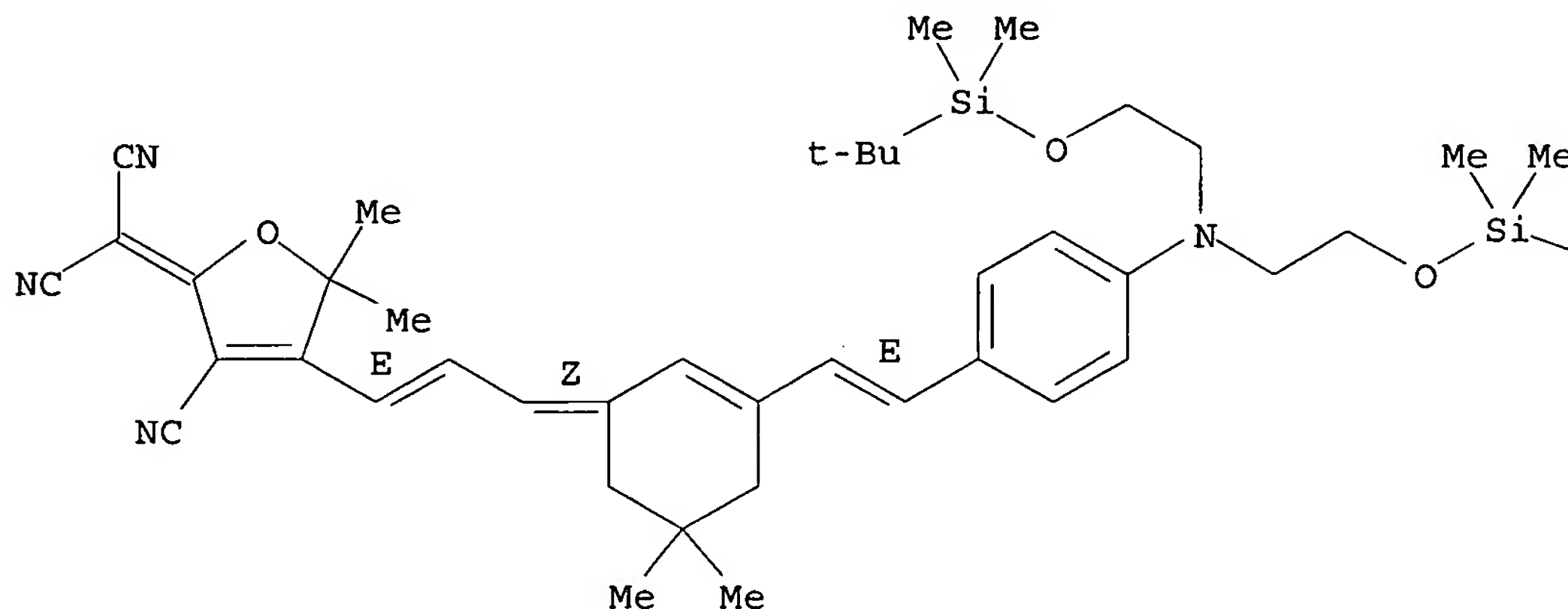
Bu-t

RN 368874-14-0 HCAPLUS

CN Propanedinitrile, [4-[(1E,3Z)-3-[3-[(1E)-2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A





PAGE 1-B

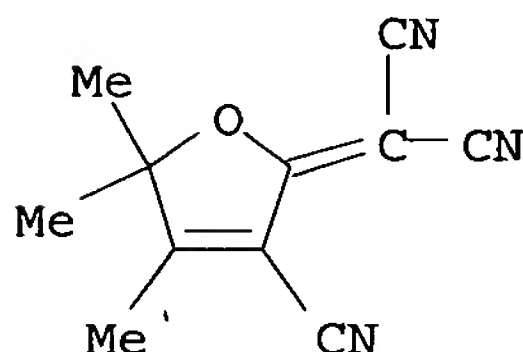
Bu-t

IT 171082-32-9

RL: RCT (Reactant); RACT (Reactant or reagent)

(low V<sub>π</sub> electrooptic modulators from CLD-1 and chromophore design  
and synthesis, material processing, and characterization)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA  
INDEX NAME)REFERENCE COUNT: 43 THERE ARE 43 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 87 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:545954 HCAPLUS

DOCUMENT NUMBER: 135:144492

TITLE: Sterically stabilized second-order nonlinear optical  
chromophores and devices incorporating the sameINVENTOR(S): Dalton, Larry R.; Zhang, Cheng; Wang, Chuanguang;  
Fetterman, Harold R.; Wang, Fang; Steier, William;  
Harper, Aaron W.; Ren, Albert S.; Michael, Joseph

PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA

SOURCE: PCT Int. Appl., 52 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 10

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2001053746	A1	20010726	WO 2001-US1655	20010117
W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY,				



DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF,  
BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

US 6361717 B1 20020326 US 2000-488422 20000120  
PRIORITY APPLN. INFO.: US 2000-488422 A 20000120  
US 1998-122806 A2 19980727

OTHER SOURCE(S): MARPAT 135:144492

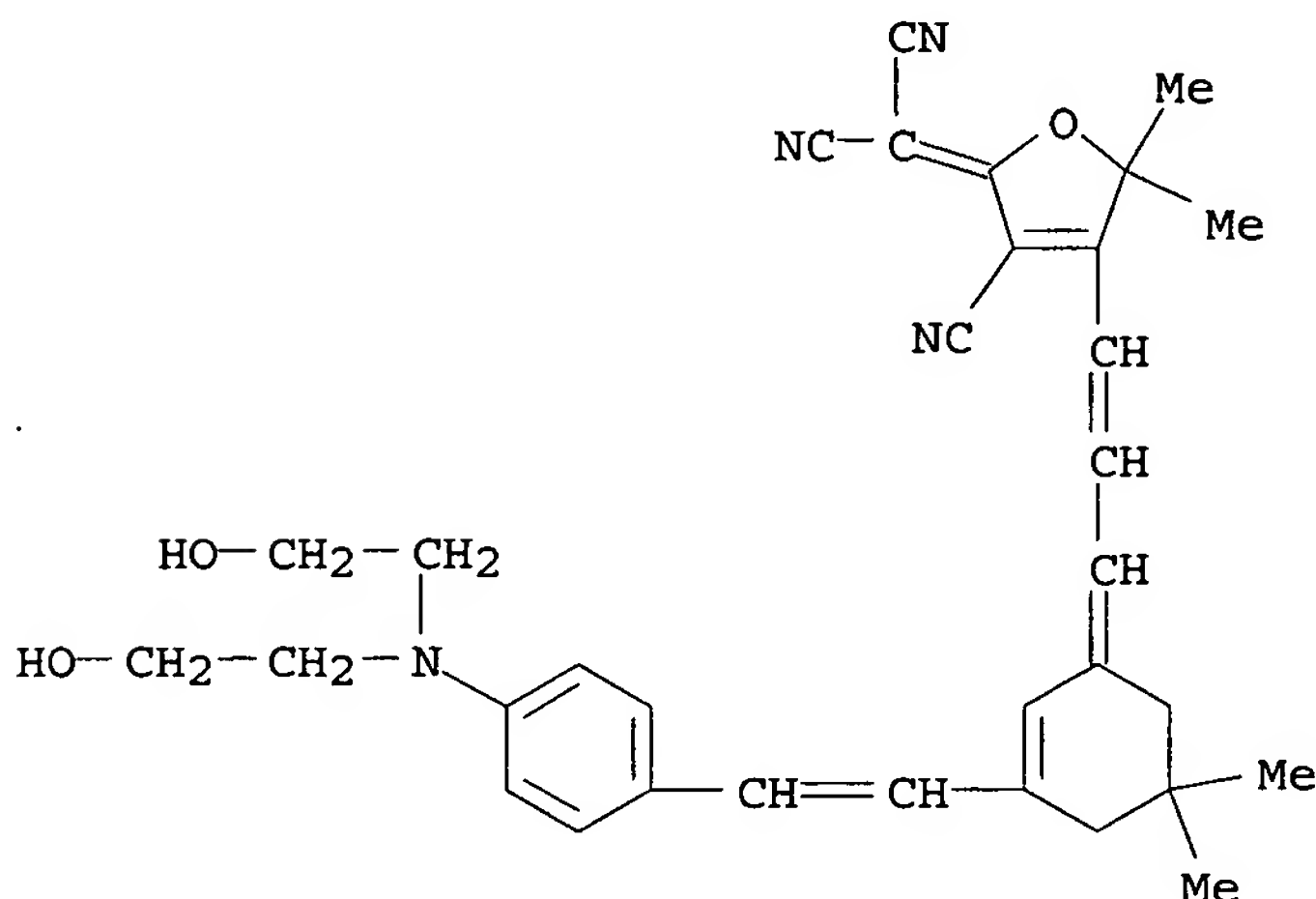
AB Nonlinear optical devices are described in which the active element incorporates a chromophore which includes an electron donor group and an electron acceptor group joined by a bridge structure, preferably a ring-locked bridge structure. Preferably, at least the electron acceptor group is bonded to the bridge structure via a conjugated diene. In a preferred embodiment, the bridge structure also includes at least one bulky side group. The bridge structure may comprise two protected alicyclic rings or ring-locked trienone. Alternately, the chromophore may include an electron donor group, a ring-locked tricyano electron acceptor group, and a bridge structure between them. The electron acceptor group may comprises an isophorone structure. The bridge structure may include a bithiophene unit or a a modified isophorone unit.

IT 224784-30-9 265992-52-7 351444-91-2  
351444-93-4 351444-95-6 351444-98-9  
351445-00-6 351445-03-9 351445-05-1  
351445-08-4 351445-10-8

RL: DEV (Device component use); USES (Uses)  
(nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

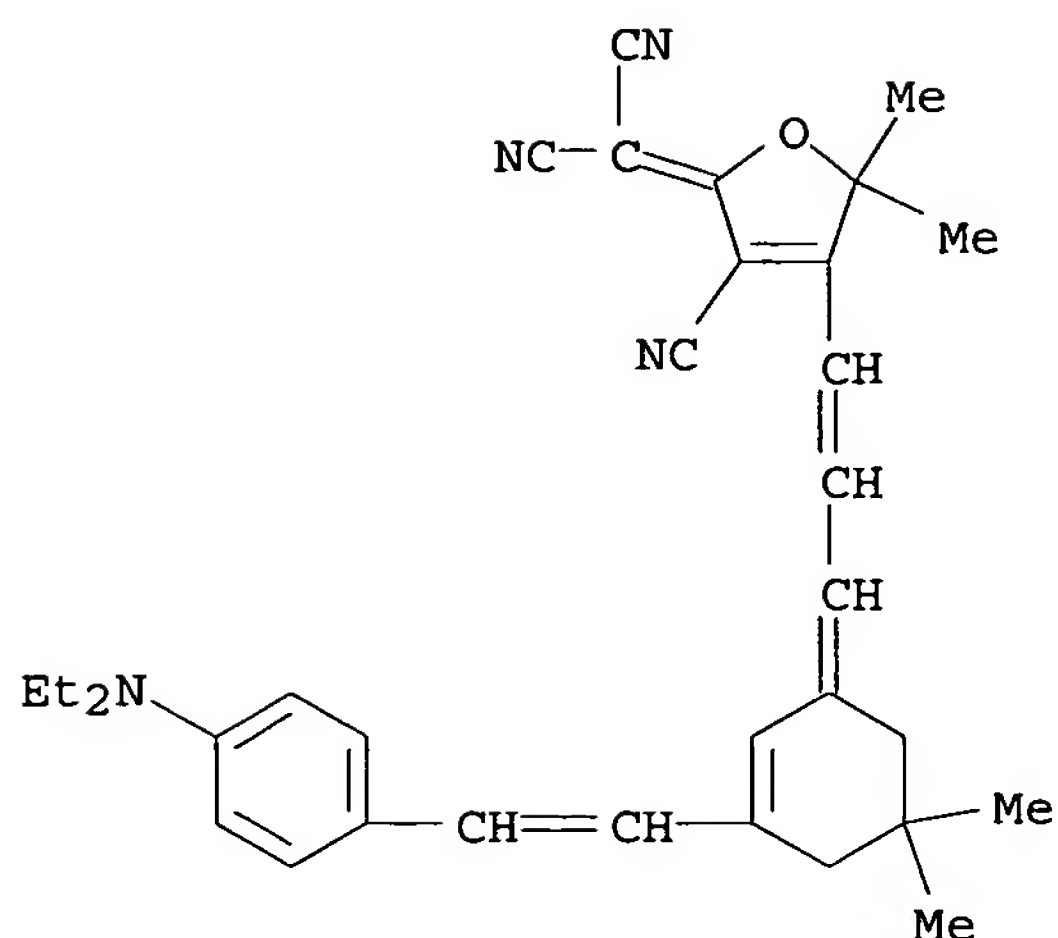
RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



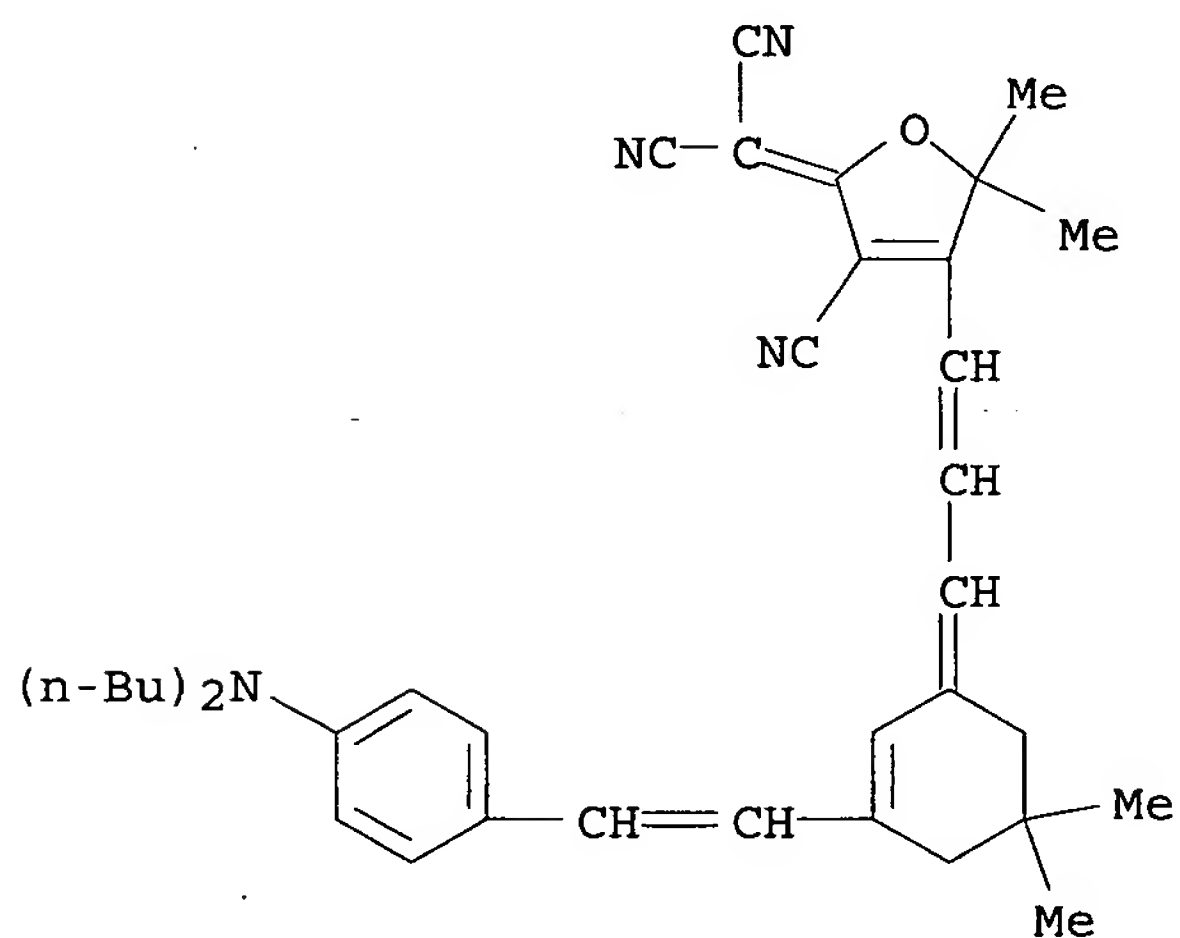
RN 265992-52-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



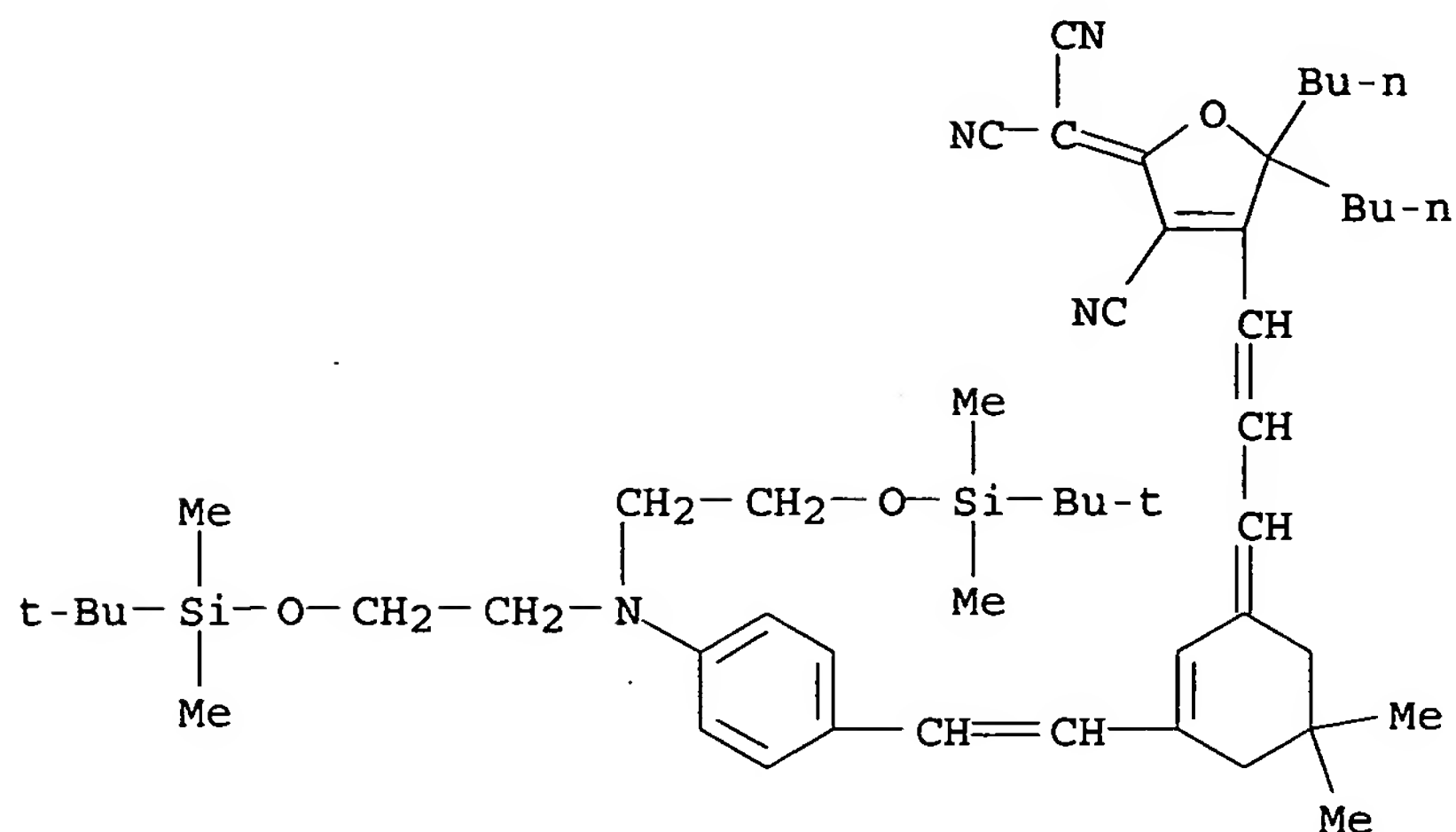
RN 351444-91-2 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(dibutylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



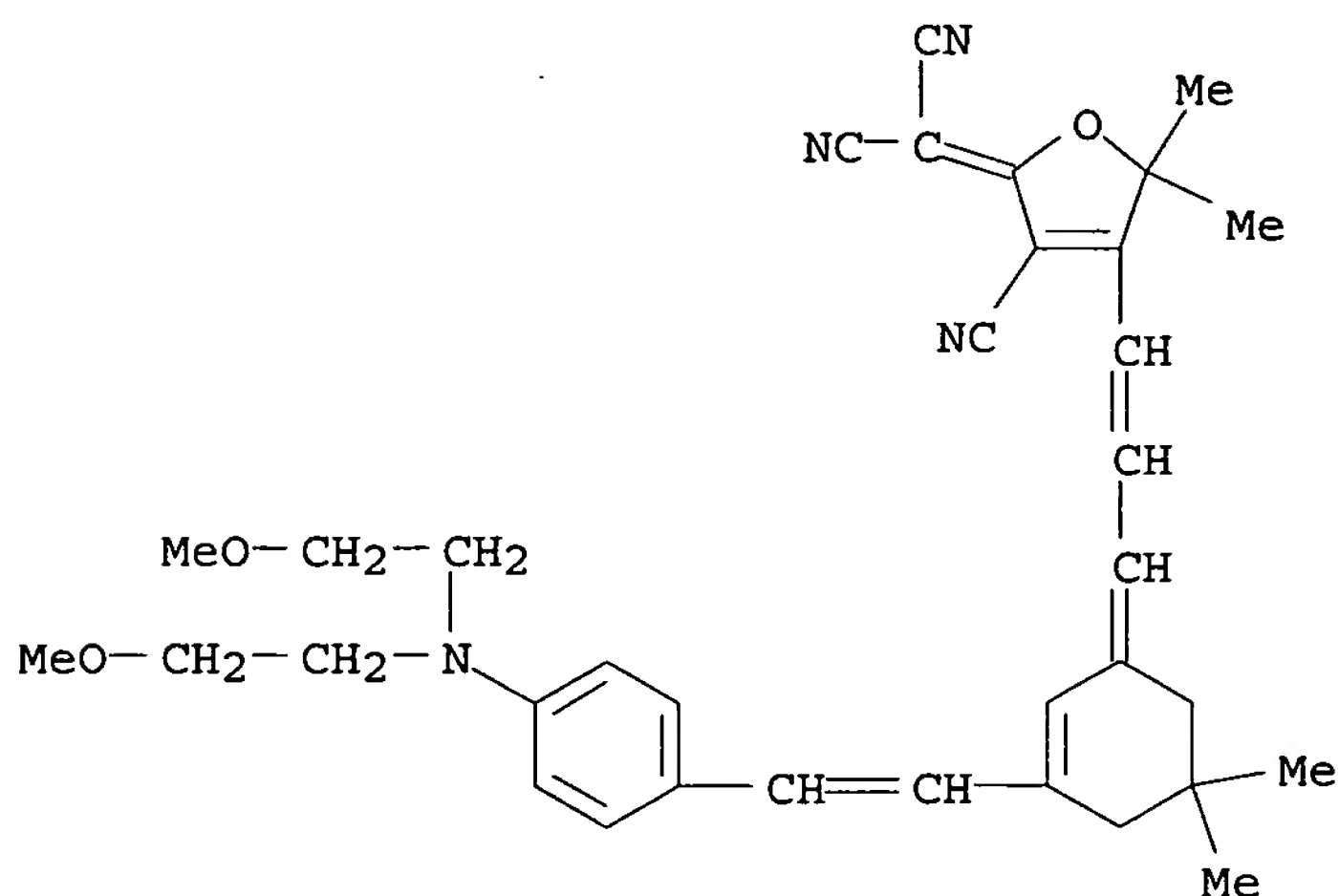
RN 351444-93-4 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



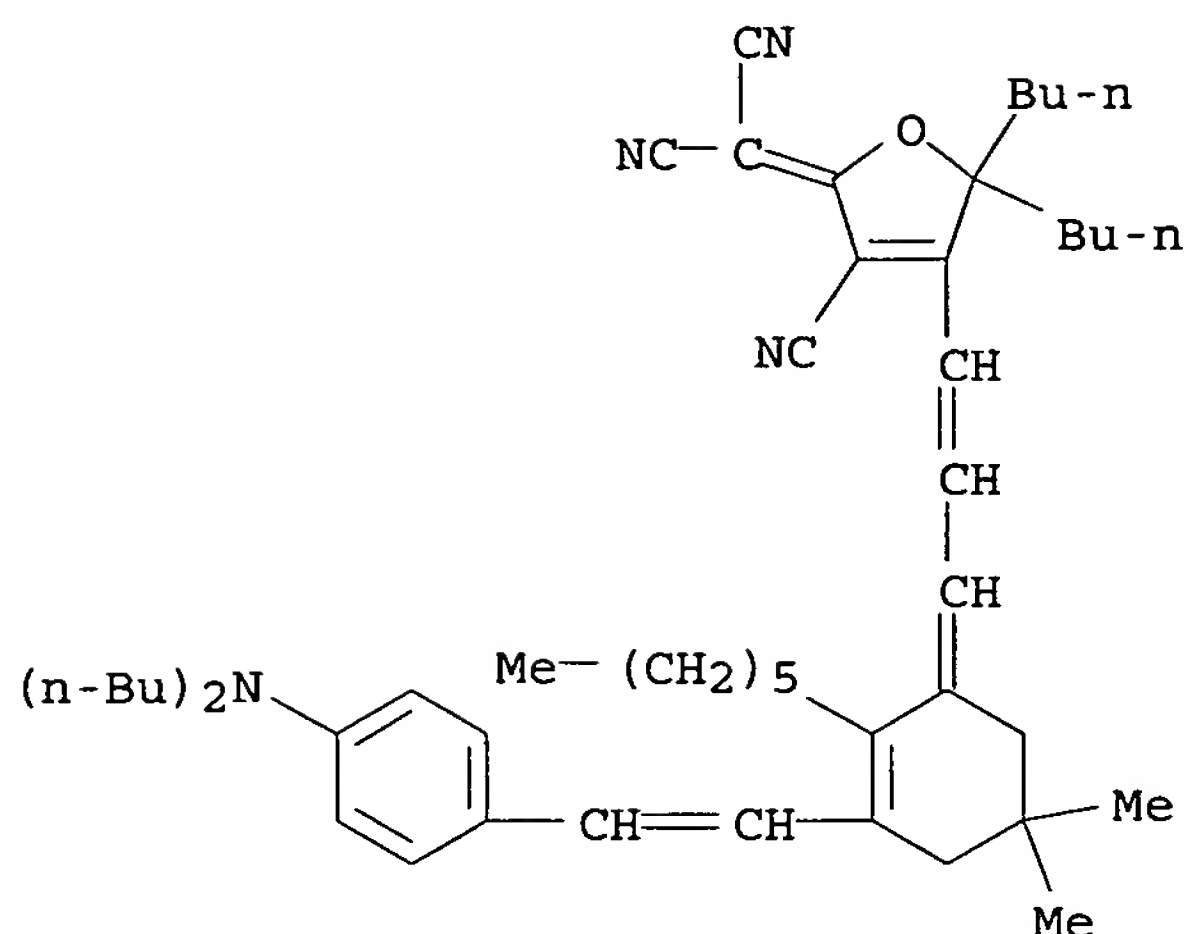
RN 351444-95-6 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



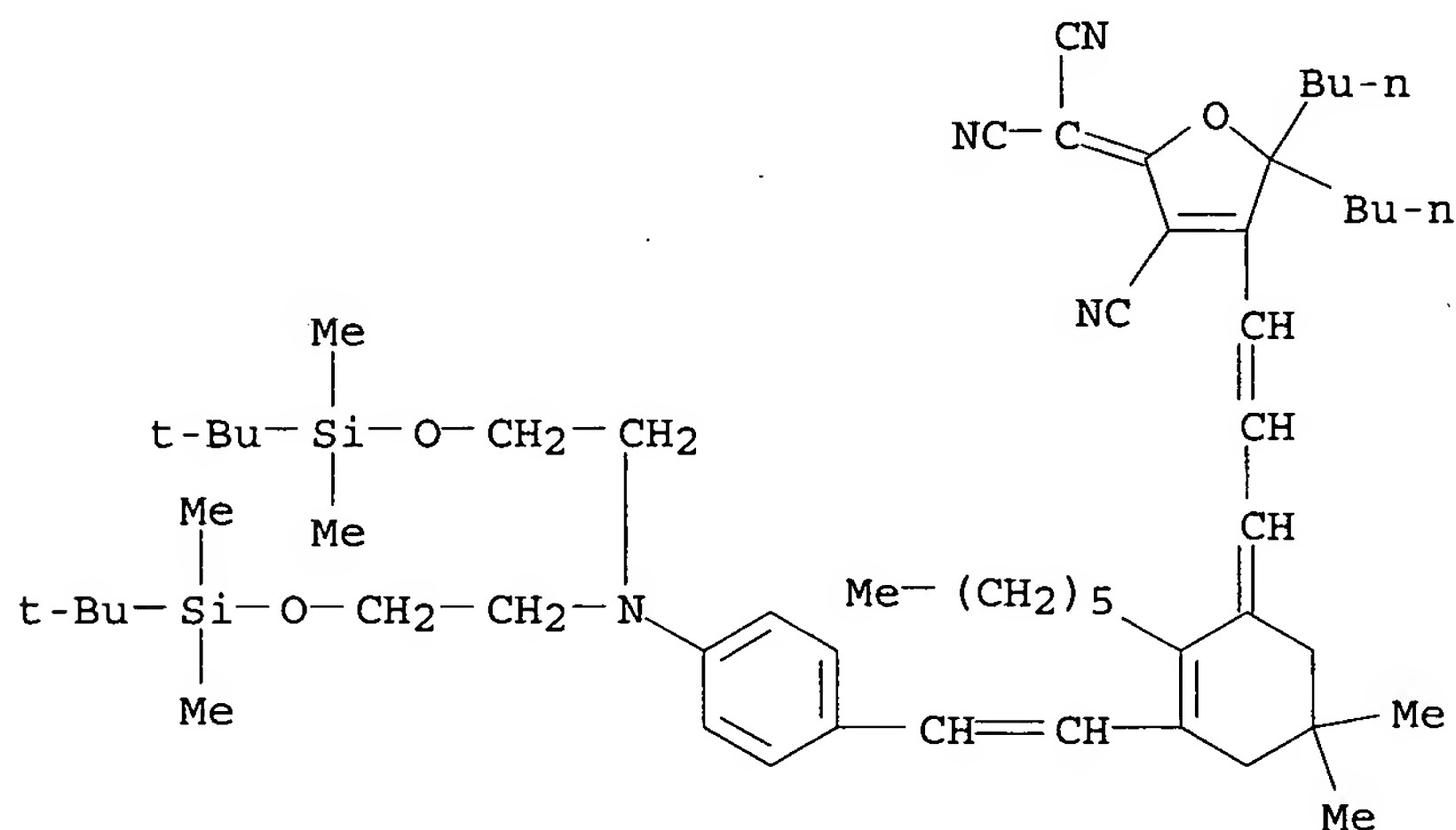
RN 351444-98-9 HCAPLUS

CN Propanedinitrile, [5,5-dibutyl-3-cyano-4-[3-[3-[2-[4-(dibutylamino)phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



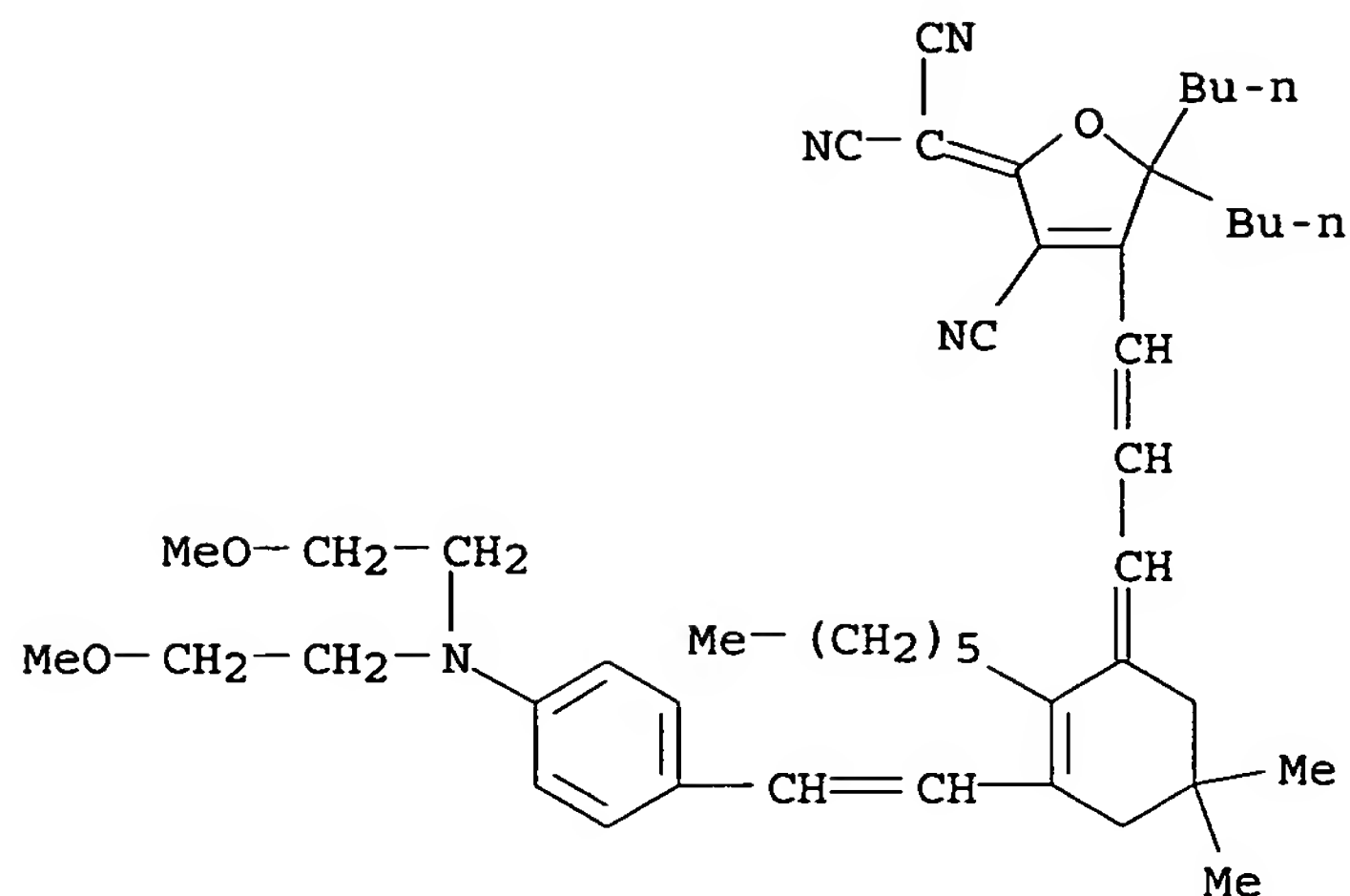
RN 351445-00-6 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



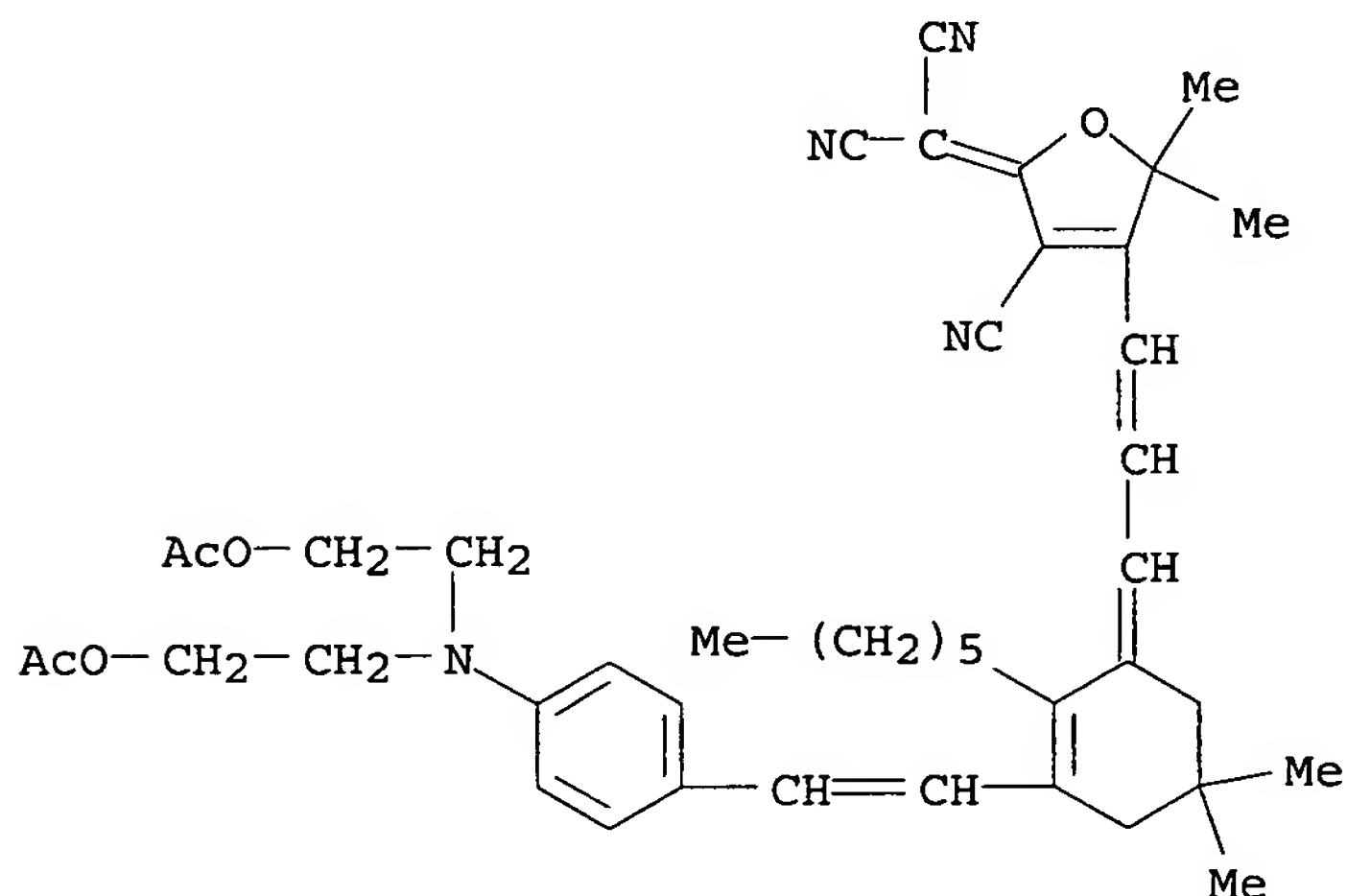
RN 351445-03-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-methoxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dibutyl-3-cyano-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



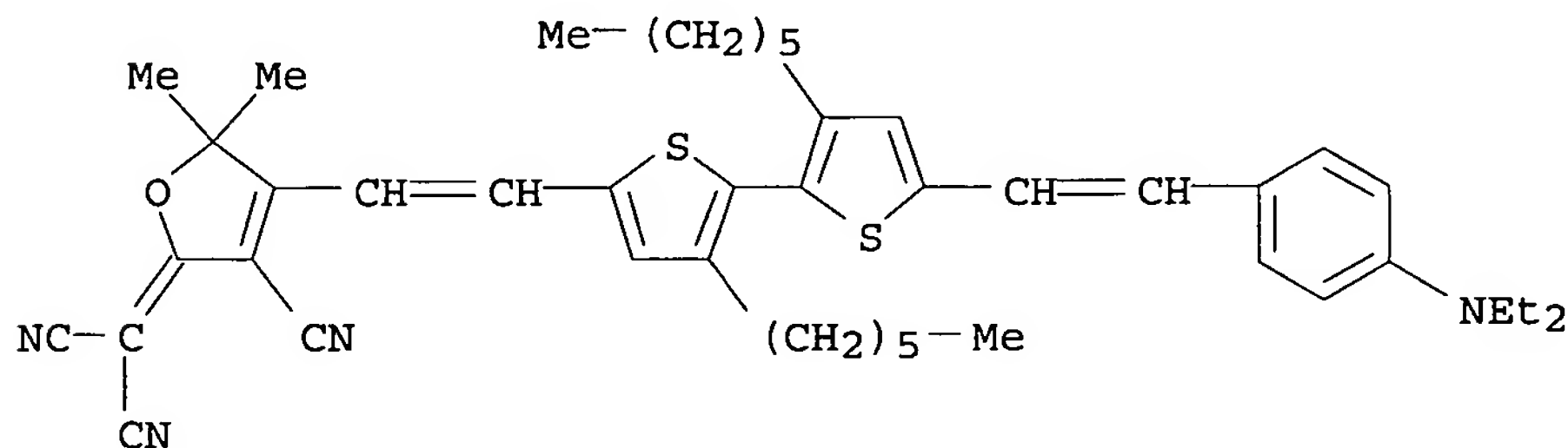
RN 351445-05-1 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 351445-08-4 HCAPLUS

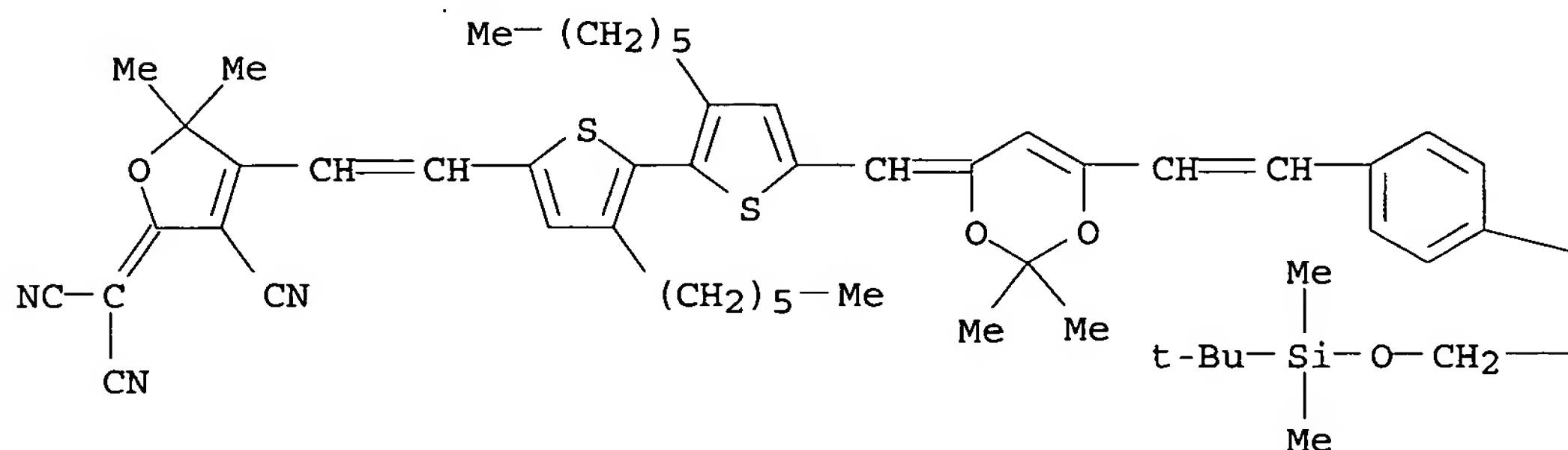
CN Propanedinitrile, [3-cyano-4-[2-[5'-[2-[4-(diethylamino)phenyl]ethenyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



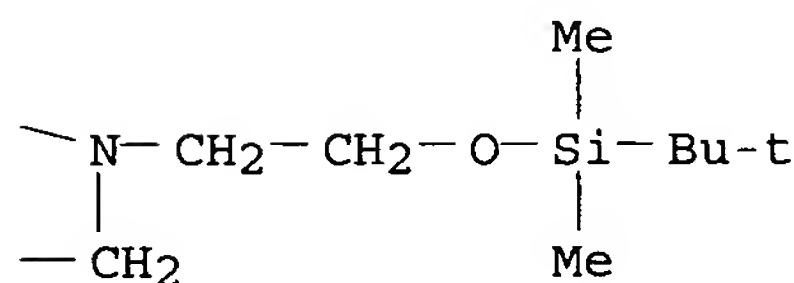
RN 351445-10-8 HCAPLUS

CN Propanedinitrile, [4-[2-[5'-[[6-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2,2-dimethyl-4H-1,3-dioxin-4-ylidene]methyl]-3,3'-dihexyl[2,2'-bithiophen]-5-yl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B

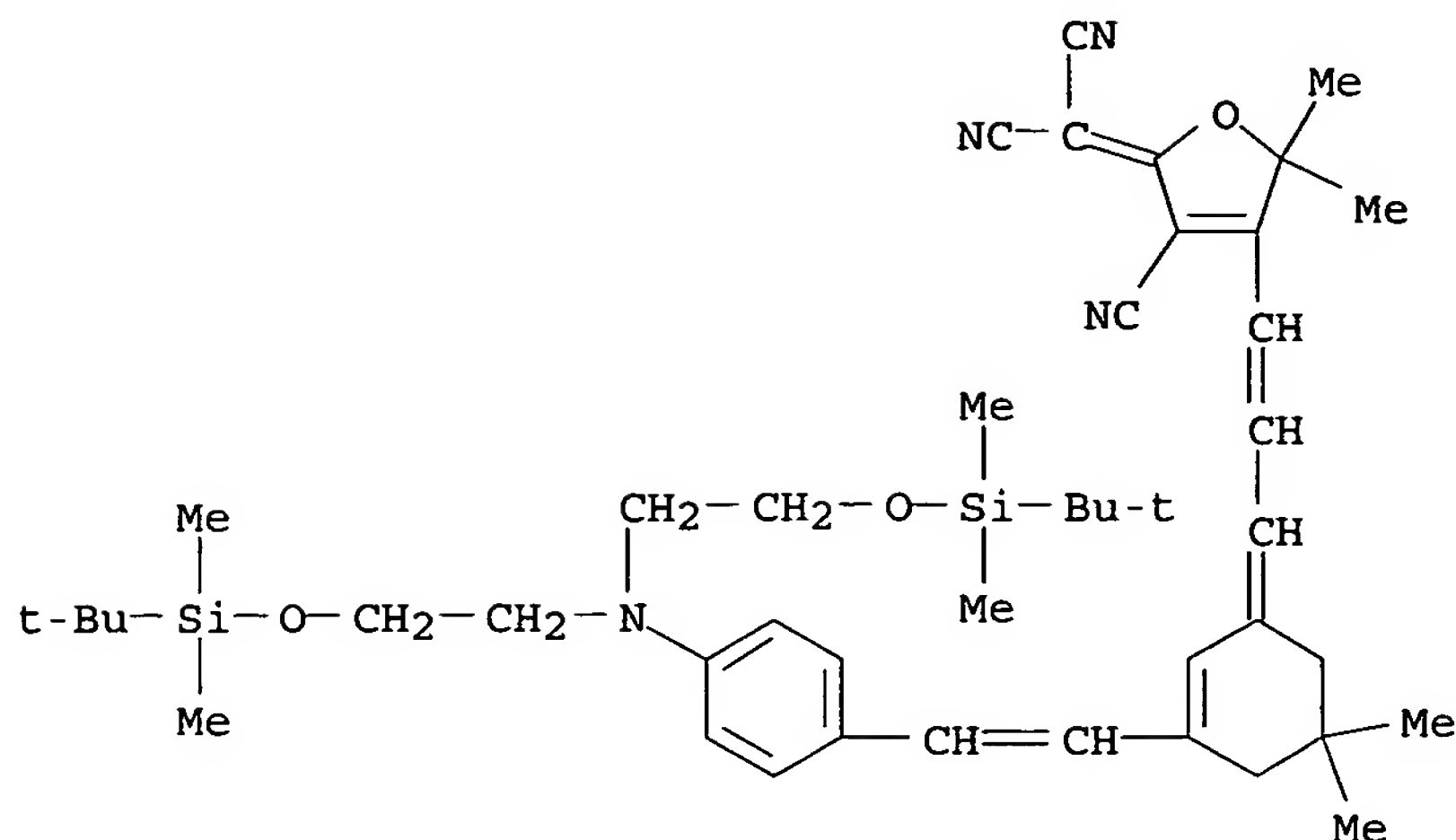


IT 266348-41-8P

RL: DEV (Device component use); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses) (nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



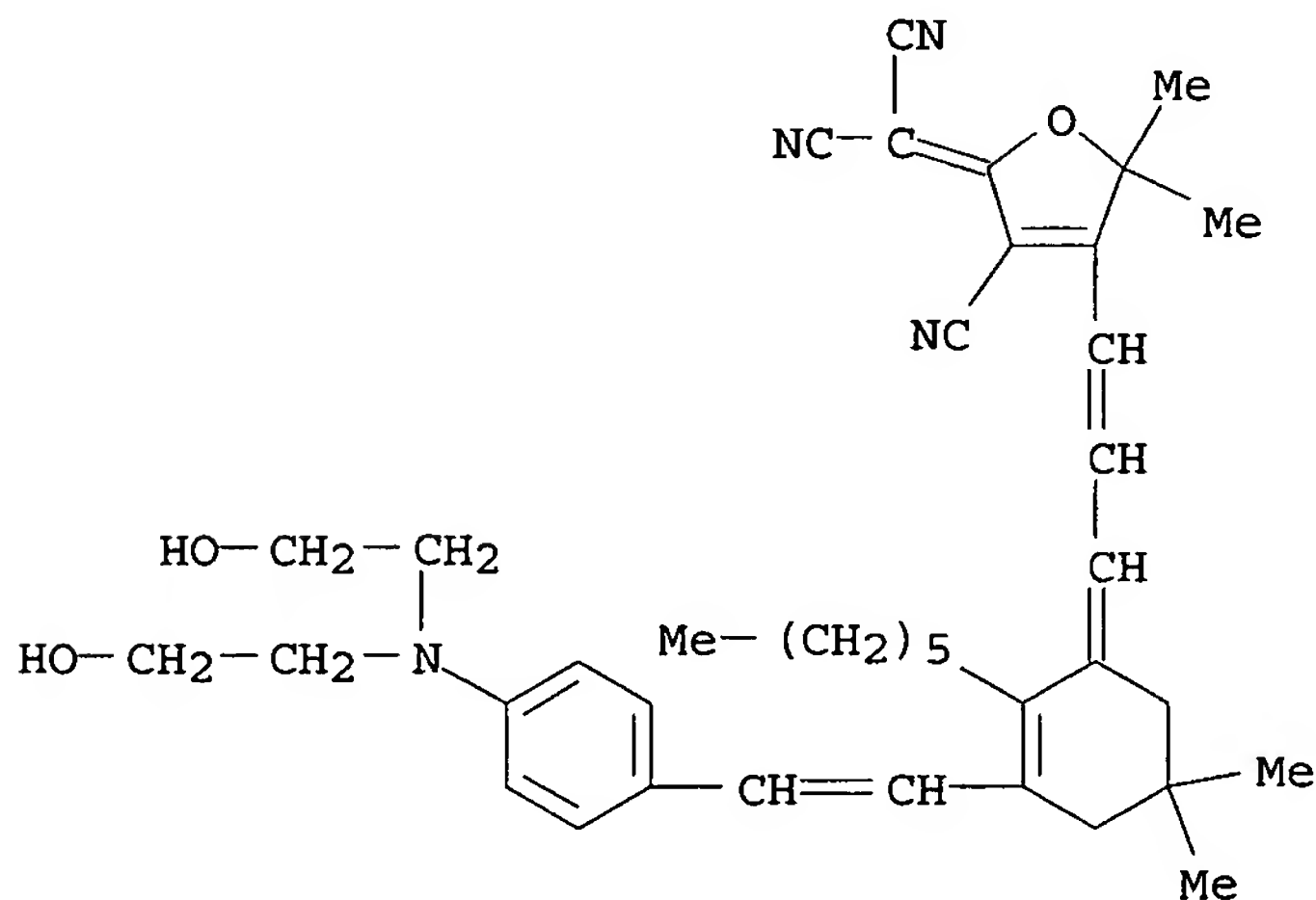
IT 259653-88-8P 351444-88-7P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furylidenel]- (9CI) (CA INDEX NAME)



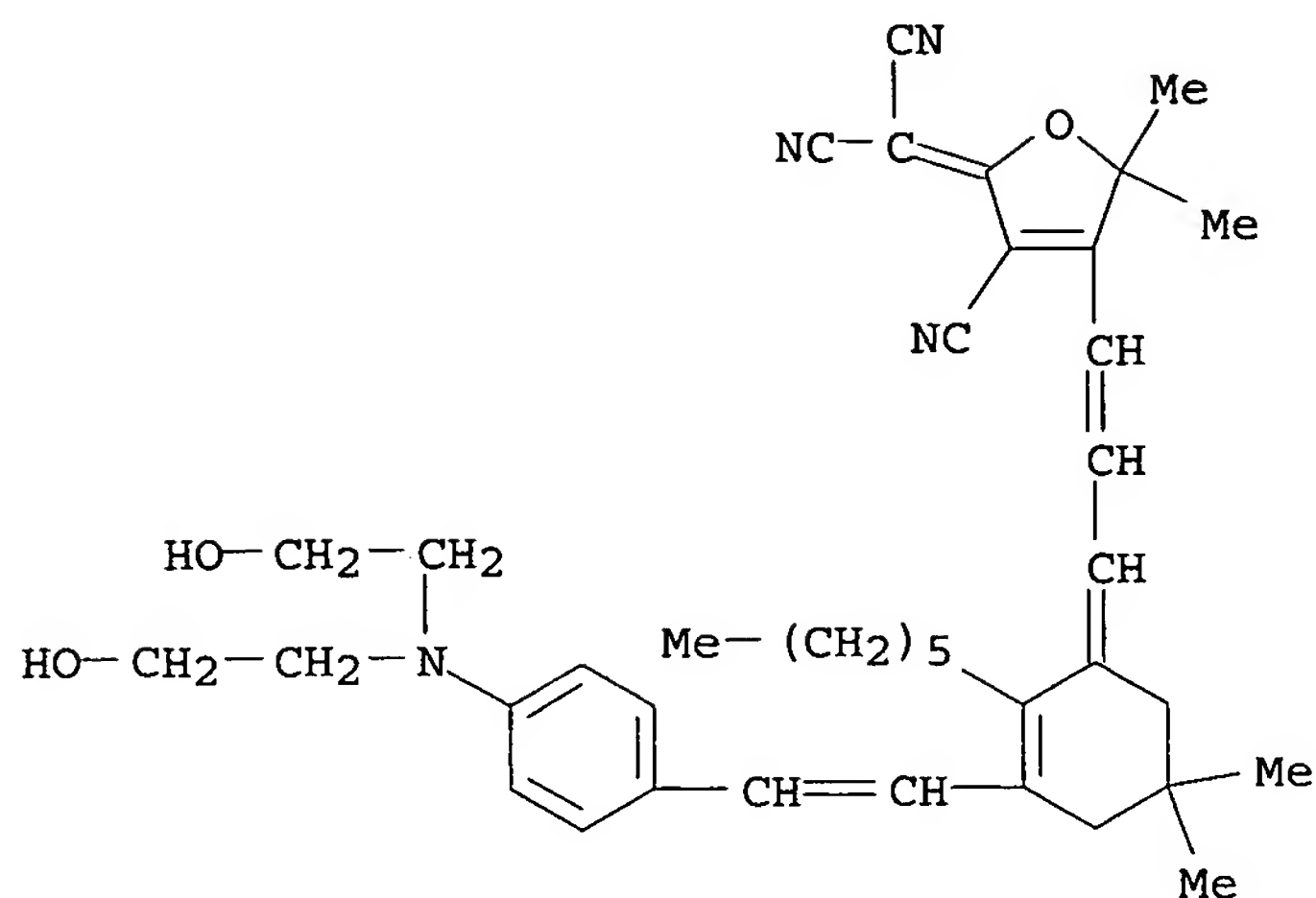
RN 351444-88-7 HCAPLUS

CN 1,4-Benzenedicarbonyl dichloride, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furylidenel]propanedinitrile and 4,4'-(1-methylethylidene)bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

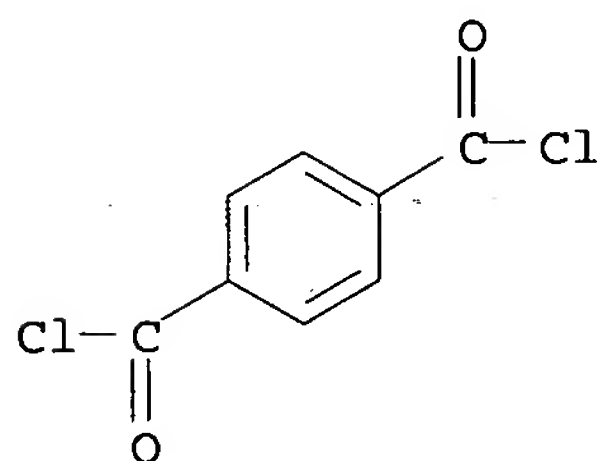
CMF C39 H48 N4 O3



CM 2

CRN 100-20-9

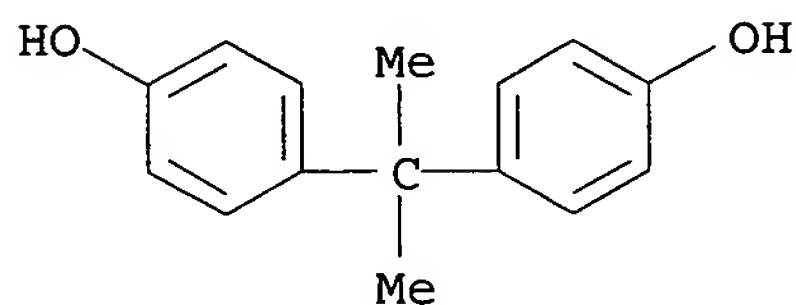
CMF C8 H4 Cl2 O2



CM 3

CRN 80-05-7

CMF C15 H16 O2



IT 171082-32-9, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran

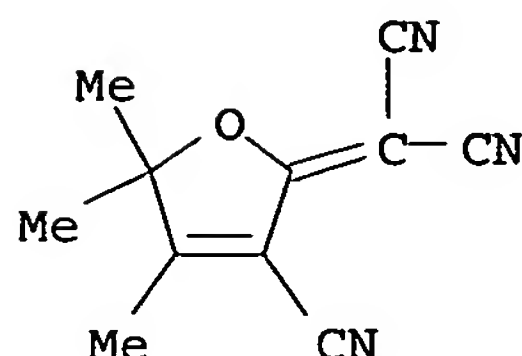
RL: RCT (Reactant); RACT (Reactant or reagent)

(nonlinear optical devices employing sterically stabilized second-order nonlinear optical chromophores)

RN 171082-32-9 HCAPLUS



CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 88 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:544550 HCAPLUS

DOCUMENT NUMBER: 135:288646

TITLE: Rapid and efficient synthesis of 2-[3-cyano-4-(2-arylidene)-5,5-dimethyl-5H-furan-2-ylidene]-malononitrile under focused microwave irradiation

AUTHOR(S): Villemin, Didier; Liao, Liang

CORPORATE SOURCE: Ecole Nationale Supérieure d'Ingenieurs de Caen, ISMRA, UMR CNRS 6507, Caen, F-14050, Fr.

SOURCE: Synthetic Communications (2001), 31(11), 1771-1780  
CODEN: SYNCAV; ISSN: 0039-7911

PUBLISHER: Marcel Dekker, Inc.

DOCUMENT TYPE: Journal

LANGUAGE: English

OTHER SOURCE(S): CASREACT 135:288646

AB New biol. potential (2-furanylidene)malonitriles were synthesized efficiently by one-pot condensation under focused microwave from starting and easy available compds. An example compound thus prepared was [3-cyano-4-[(E)-2-(2-furanyl)ethenyl]-5,5-dimethyl-2(5H)-furanylidene]propanedinitrile.

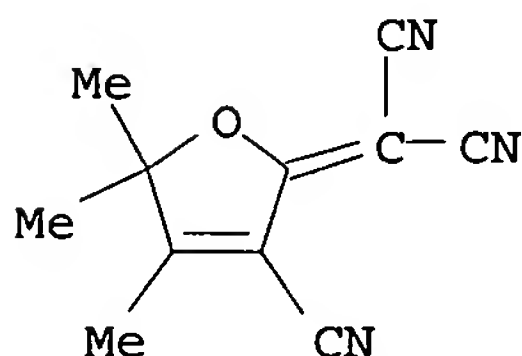
IT 171082-32-9P, 2-(Dicyanomethylene)-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(preparation of [3-cyano-4-[(E)-2-(aryl)ethenyl]-5,5-dimethyl-2(5H)-furanylidene]propanedinitriles)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



IT 364599-36-0P 364599-37-1P 364599-38-2P  
364599-39-3P 364599-40-6P 364599-41-7P  
364599-42-8P 364599-43-9P 364599-44-0P

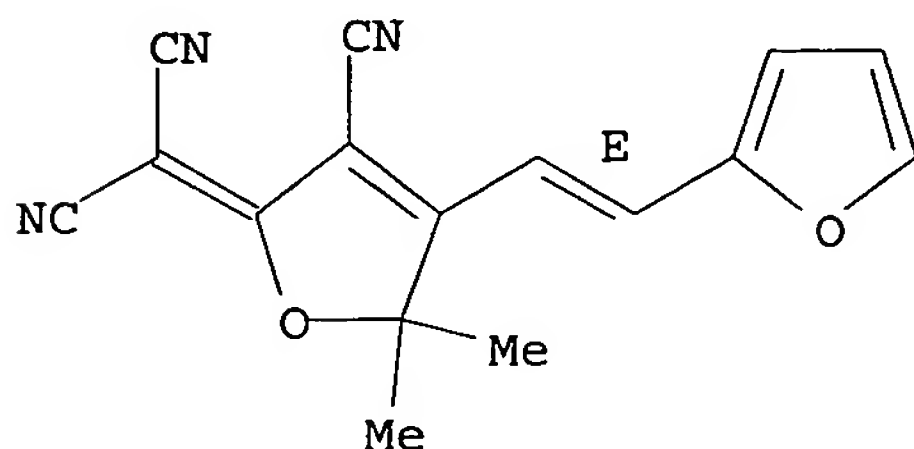
**364599-45-1P**

RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of [3-cyano-4-[(E)-2-(aryl)ethenyl]-5,5-dimethyl-2(5H)-  
furanylidene]propanedinitriles)

RN 364599-36-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[(1E)-2-(2-furanyl)ethenyl]-5,5-dimethyl-  
2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

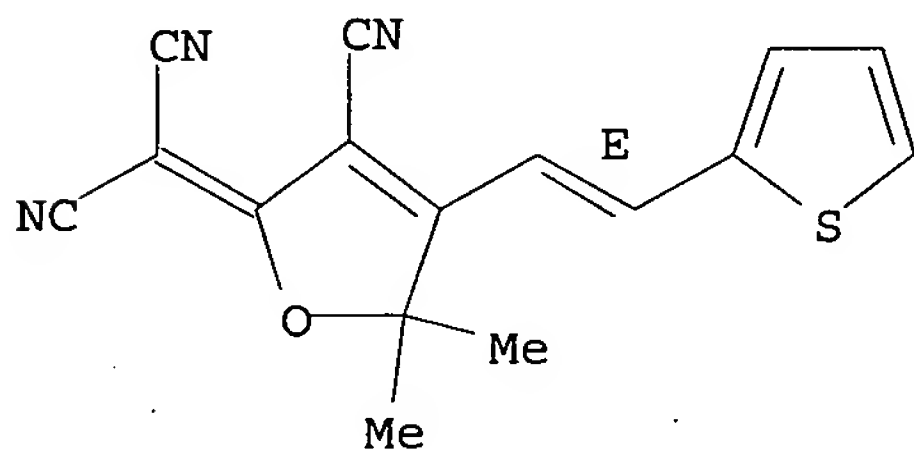
Double bond geometry as shown.



RN 364599-37-1 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(1E)-2-(2-thienyl)ethenyl]-  
2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

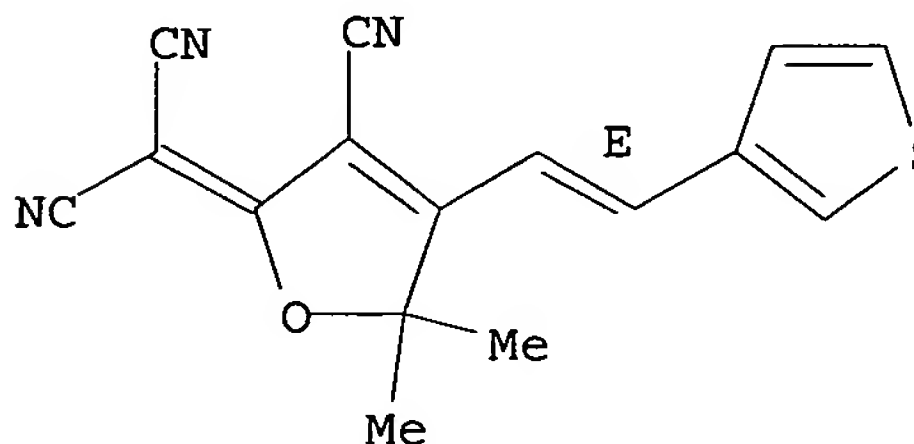
Double bond geometry as shown.



RN 364599-38-2 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(1E)-2-(3-thienyl)ethenyl]-  
2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

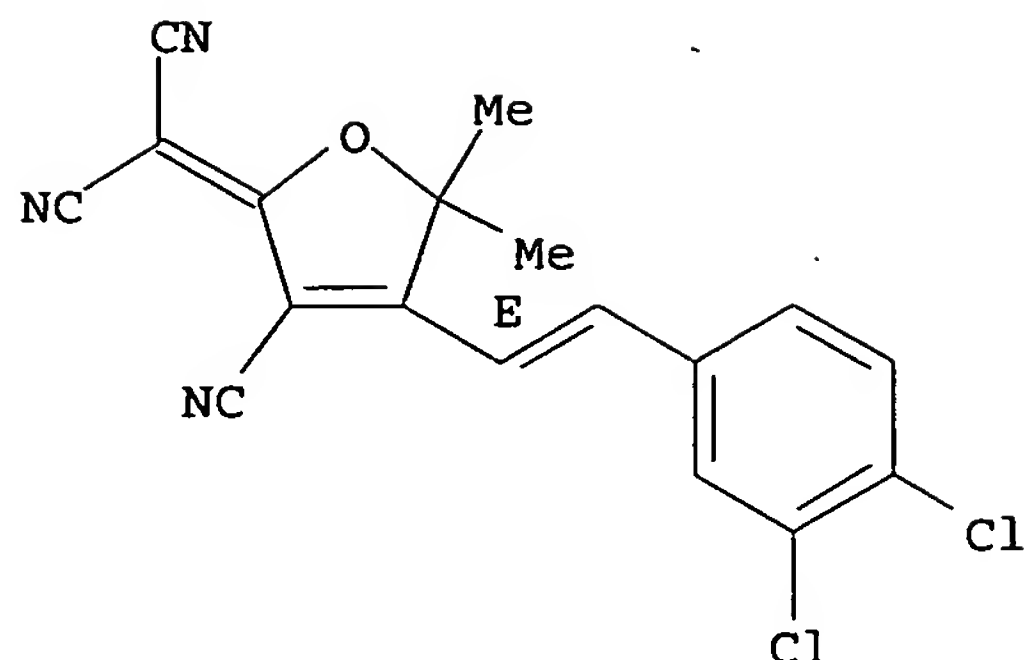
Double bond geometry as shown.



RN 364599-39-3 HCAPLUS

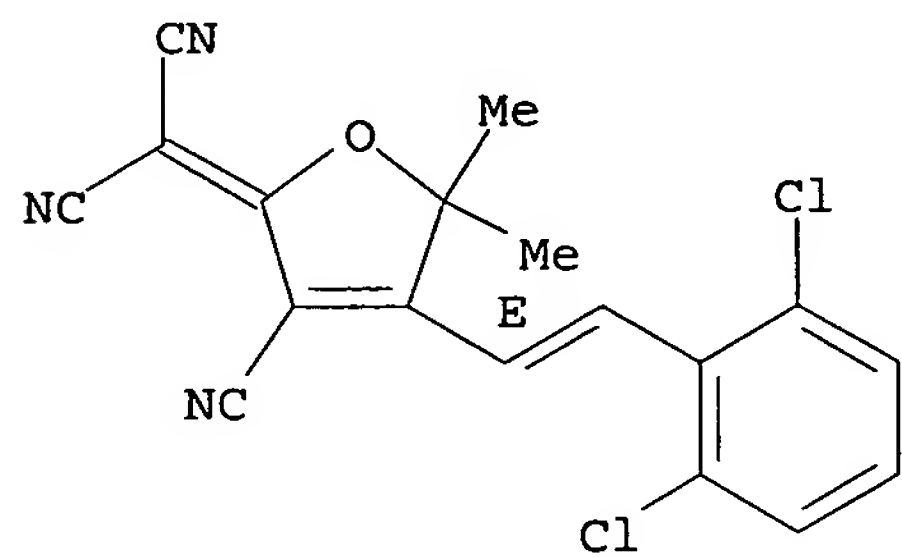
CN Propanedinitrile, [3-cyano-4-[(1E)-2-(3,4-dichlorophenyl)ethenyl]-5,5-  
dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



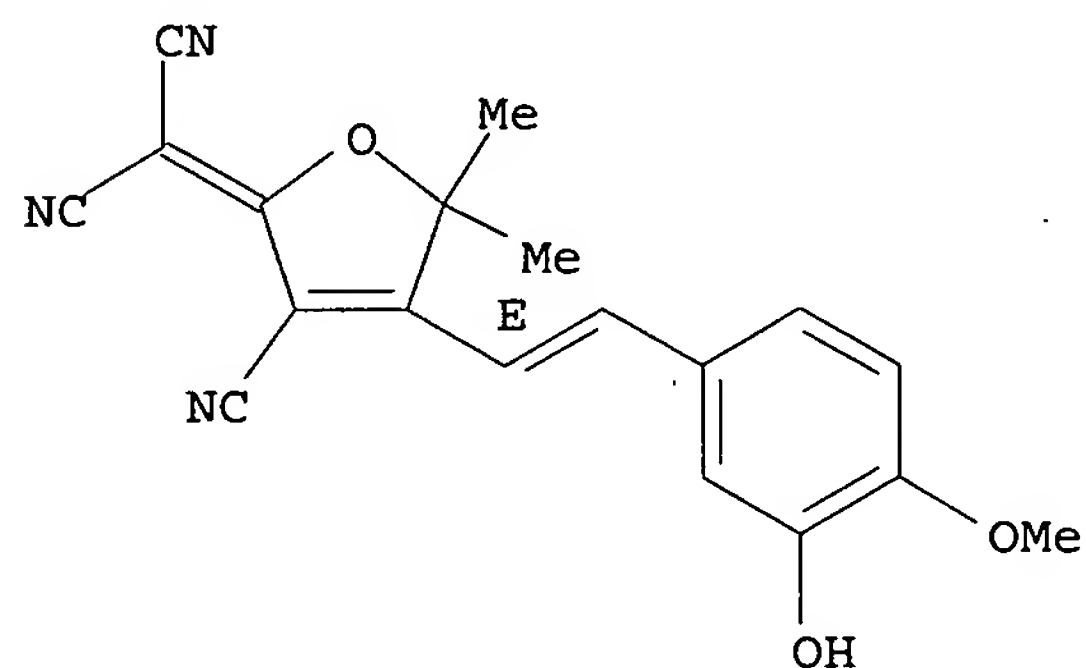
RN 364599-40-6 HCAPLUS  
CN Propanedinitrile, [3-cyano-4-[(1E)-2-(2,6-dichlorophenyl)ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.



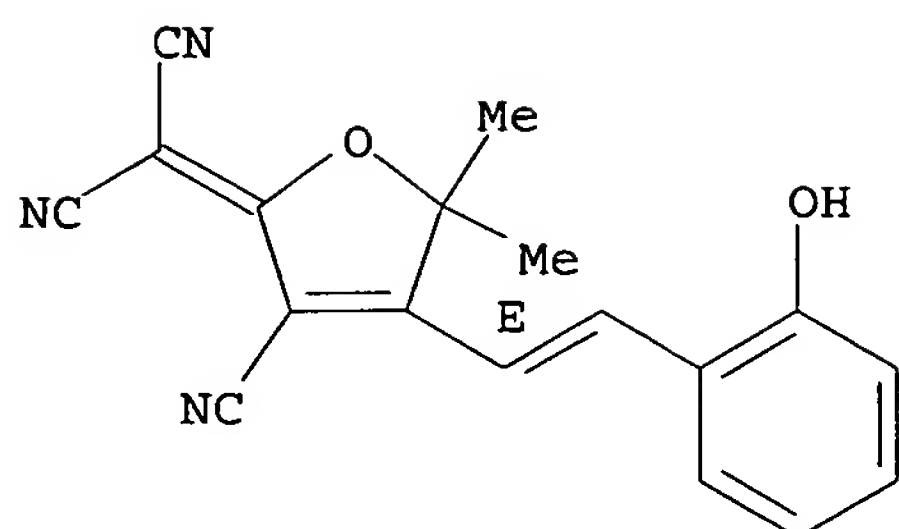
RN 364599-41-7 HCAPLUS  
CN Propanedinitrile, [3-cyano-4-[(1E)-2-(3-hydroxy-4-methoxyphenyl)ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.



RN 364599-42-8 HCAPLUS  
CN Propanedinitrile, [3-cyano-4-[(1E)-2-(2-hydroxyphenyl)ethenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

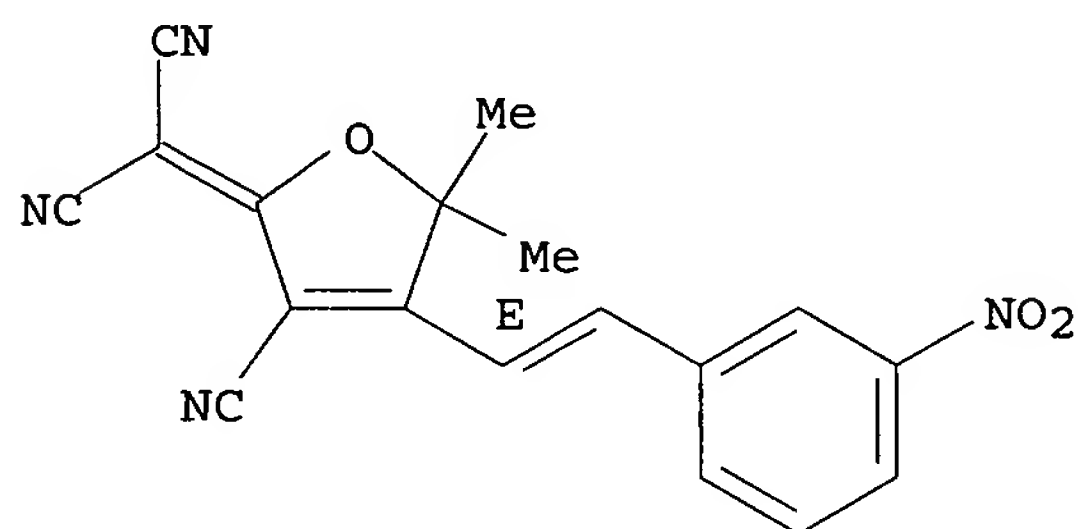
Double bond geometry as shown.



RN 364599-43-9 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(1E)-2-(3-nitrophenyl)ethenyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

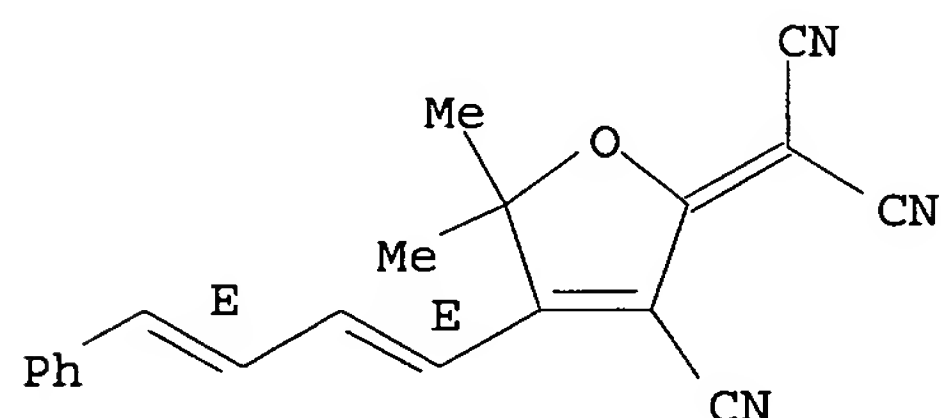
Double bond geometry as shown.



RN 364599-44-0 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[(1E,3E)-4-phenyl-1,3-butadienyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

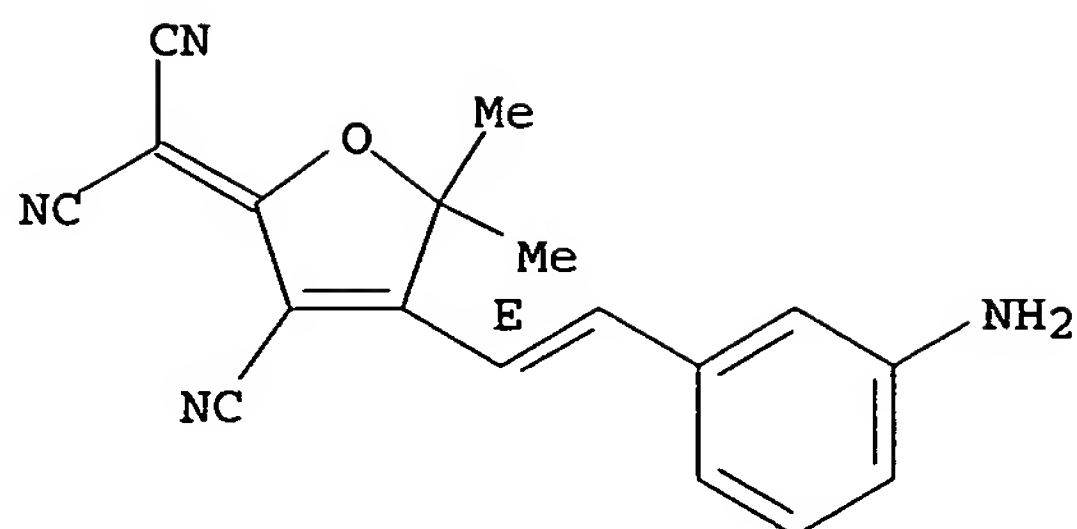
Double bond geometry as shown.



RN 364599-45-1 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-(3-aminophenyl)ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 18 THERE ARE 18 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 89 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:425192 HCAPLUS

DOCUMENT NUMBER: 135:218335

TITLE: Production of high bandwidth polymeric electro-optic modulators with  $V\pi$  voltages of less than 1 volt

AUTHOR(S): Dalton, Larry; Robinson, Bruce; Steier, William

CORPORATE SOURCE: Department of Chemistry, University of Washington, Seattle, WA, 98195-1700, USA

SOURCE: MCLC S&T, Section B: Nonlinear Optics (2000), 25(1-4), 23-34

CODEN: MCLOEB; ISSN: 1058-7268

PUBLISHER: Gordon & Breach Science Publishers

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Structure/function relations crucial to realization of broad bandwidth, low halfwave voltage, high stability polymeric electrooptic modulators are discussed. Particular attention is given a family of chromophores containing cyanofuran acceptors. Such chromophores permit the simultaneous realization of large mol. hyperpolarizability and thermal stability. The role of intermol. electrostatic interactions in limiting maximum achievable macroscopic electrooptic activity is discussed within the frameworks of both equilibrium and Monte Carlo statistical mech. calcns. The processing of polymeric electrooptic materials into low optical loss, 3-dimensional optical circuits is discussed. Finally, the use of polymeric electrooptic circuits for realization of phased array radar, time stretching, and other device applications is reviewed.

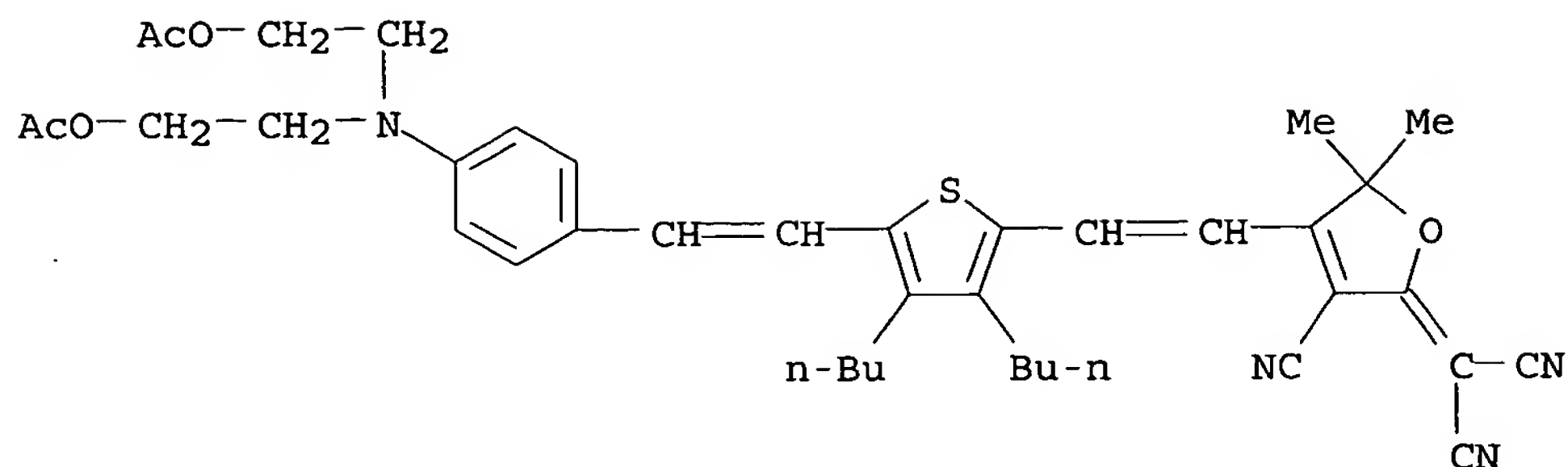
IT 213131-98-7 265992-52-7 265992-53-8  
265992-54-9

RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)

(production of high bandwidth polymeric electro-optic modulators with  $V\pi$  voltages of less than 1 V)

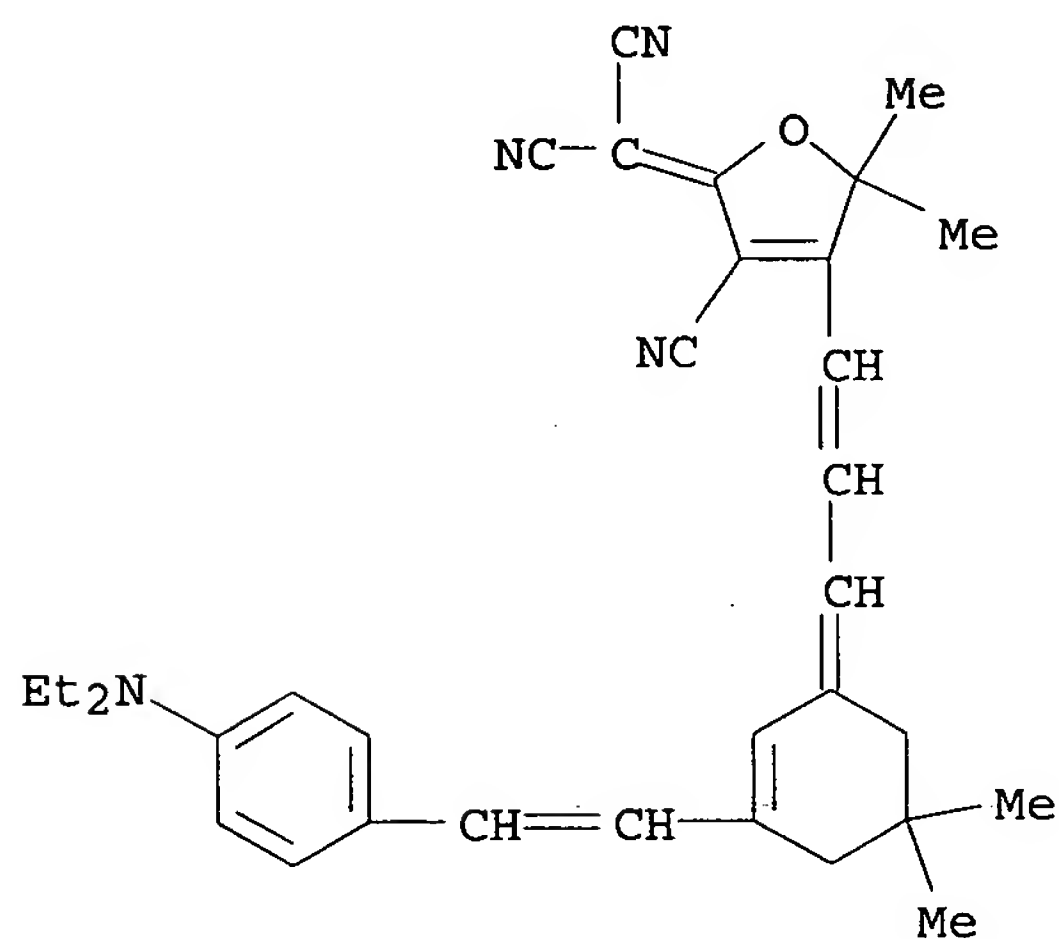
RN 213131-98-7 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 265992-52-7 HCAPLUS

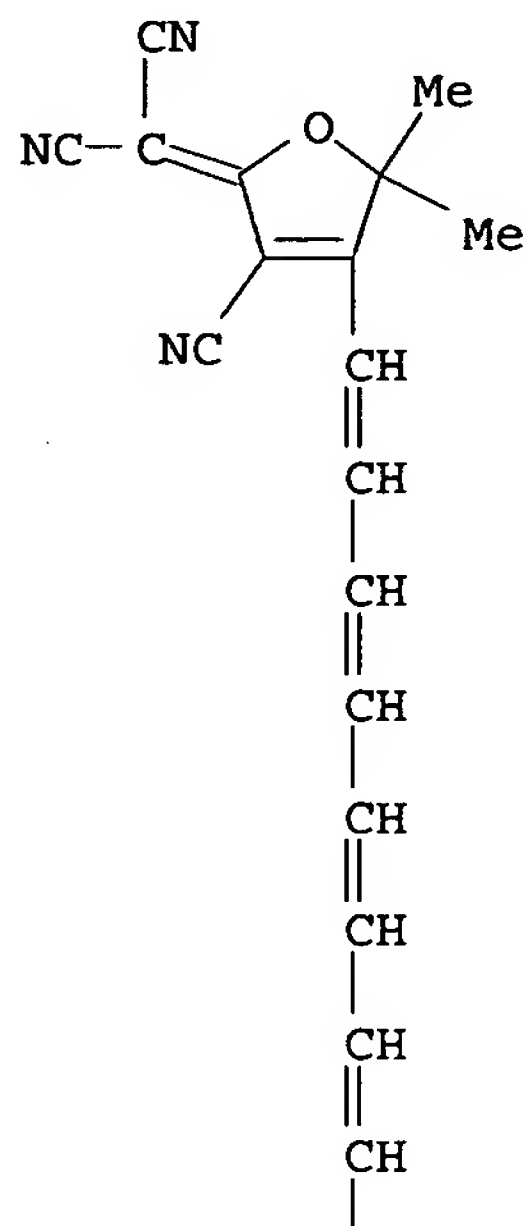
CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



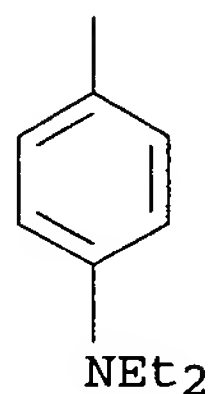
RN 265992-53-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[8-[4-(diethylamino)phenyl]-1,3,5,7-octatetraenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

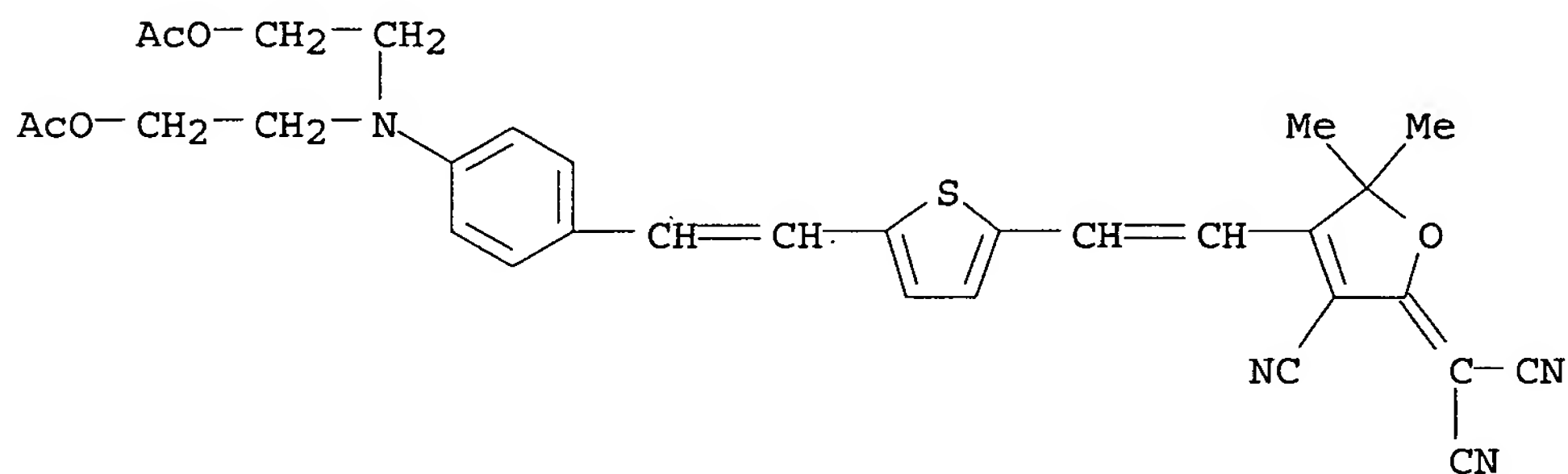
PAGE 1-A



PAGE 2-A



RN 265992-54-9 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene] - (9CI)  
 (CA INDEX NAME)



REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS

RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 90 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:235136 HCAPLUS

DOCUMENT NUMBER: 135:114082

TITLE: Resonant and nonresonant hyper-Rayleigh scattering of charge-transfer chromophores

AUTHOR(S): Wang, C. H.; Woodford, J. N.; Zhang, C.; Dalton, L. R.

CORPORATE SOURCE: Department of Chemistry, University of Nebraska-Lincoln, Lincoln, NE, 68588-0304, USA

SOURCE: Journal of Applied Physics (2001), 89(8), 4209-4217

CODEN: JAPIAU; ISSN: 0021-8979

PUBLISHER: American Institute of Physics

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The 1st mol. hyperpolarizabilities ( $\beta$ ) of charge-transfer nonlinear optical (NLO) chromophores are measured with the hyper-Rayleigh scattering (HRS) technique using 2 excitation wavelengths at 1064 and 1907 nm. The 1907 nm wavelength is the longest excitation wavelength used for the HRS experiment. For some of these chromophores,  $\beta$  values  $>1000 + 10^{-30}$  esu at 1907 nm are obtained, and due to 2-photon enhancement, even greater  $\beta$  values are found with the 1064 nm excitation. Chromophores with such large hyperpolarizability are expected to have potential applications in practical electrooptical devices. The dispersion of  $\beta$  is analyzed using a 2-vibronic-state model developed previously in laboratory. The study shows that it is necessary to consider the vibronic structure of the chromophore in the excited state to account for the behavior of the 1st mol. hyperpolarizability of the charge-transfer NLO chromophores.

IT 224784-30-9 243463-19-6 243463-22-1

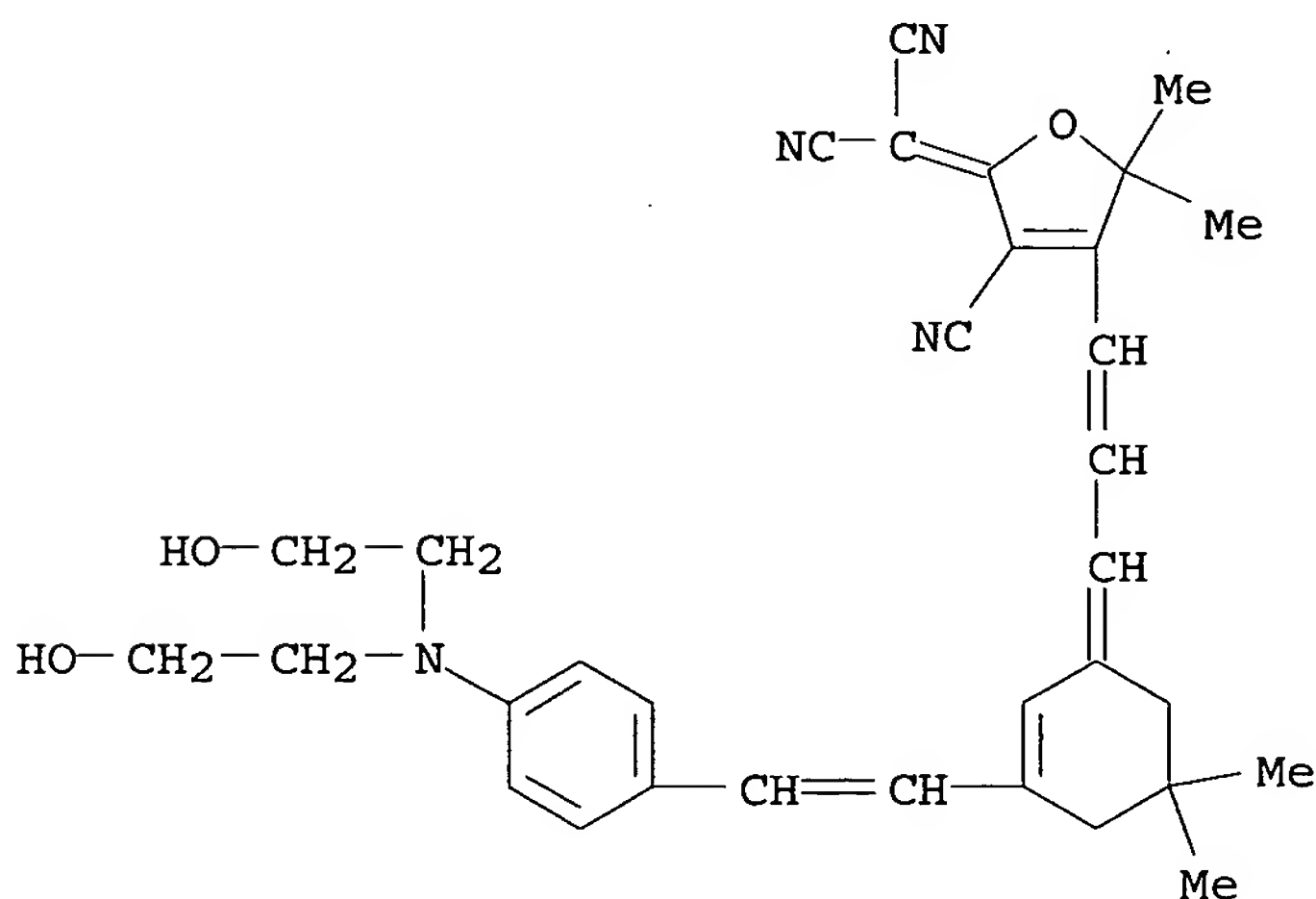
259653-88-8 266348-41-8

RL: PRP (Properties)

(resonant and nonresonant hyper-Rayleigh scattering of charge-transfer chromophores)

RN 224784-30-9 HCAPLUS

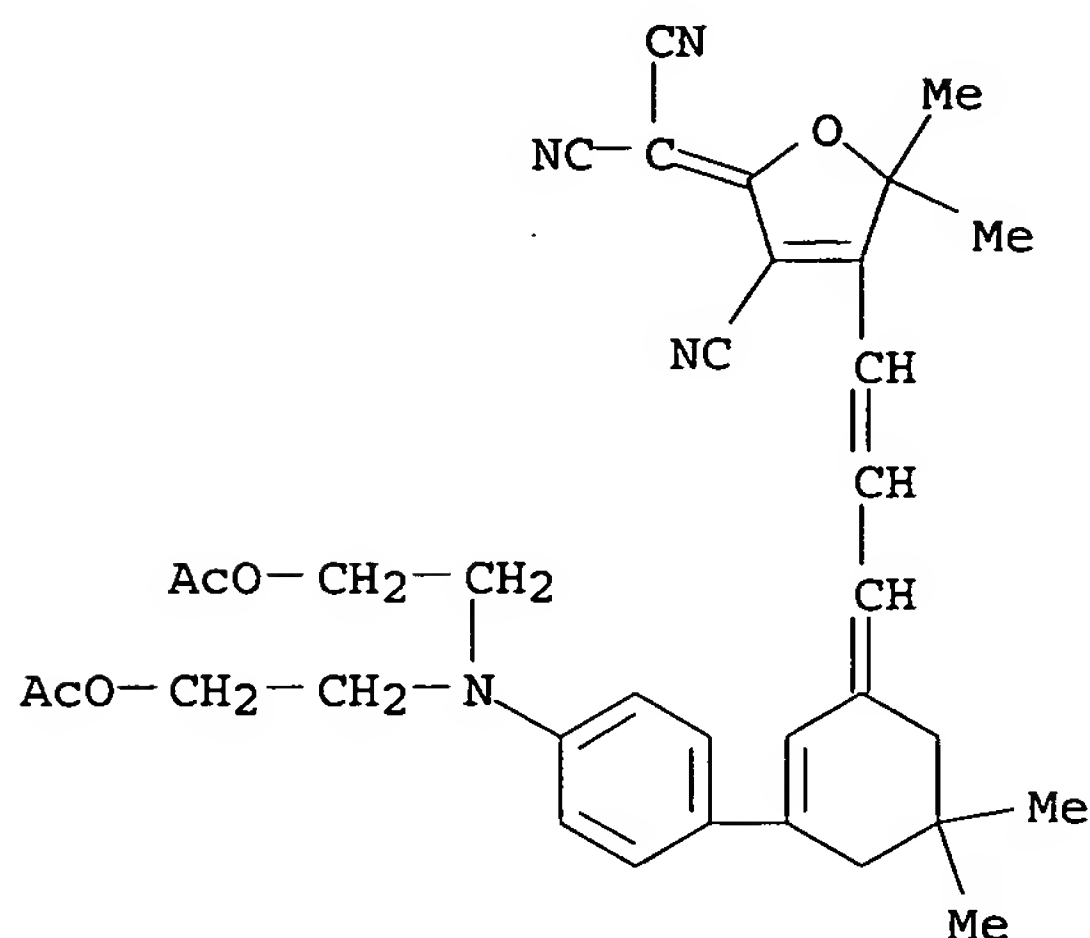
CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]-(9CI) (CA INDEX NAME)



RN 243463-19-6 HCAPLUS



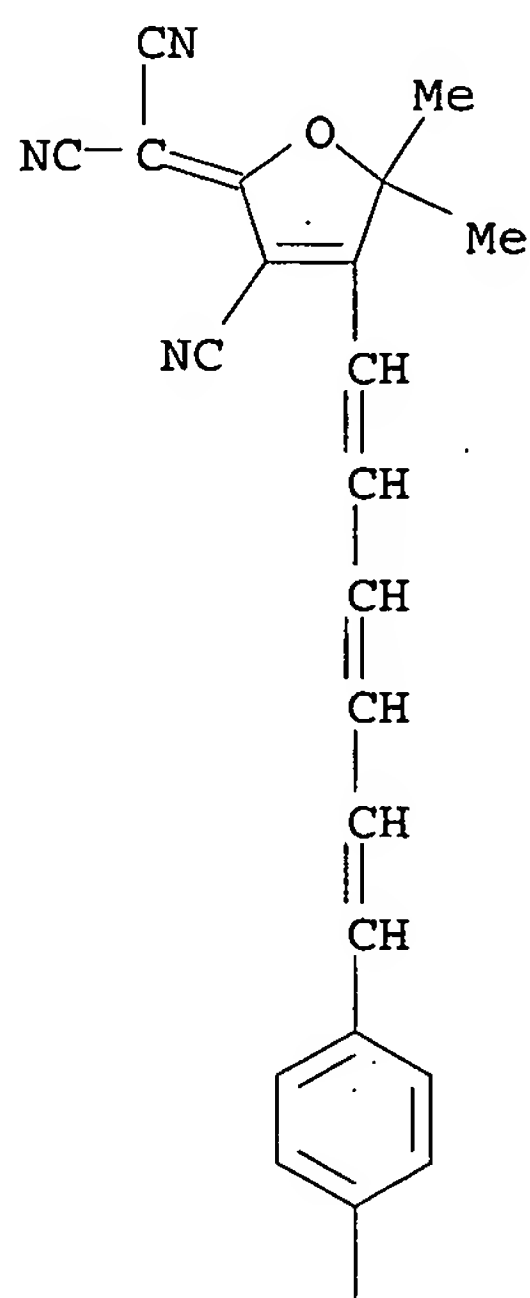
CN Propanedinitrile, [4-[3-[3-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



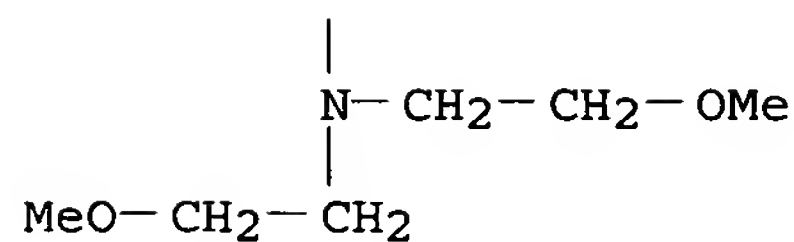
RN 243463-22-1 HCAPLUS

CN Propanedinitrile, [4-[6-[4-[bis(2-methoxyethyl)amino]phenyl]-1,3,5-hexatrienyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

PAGE 1-A

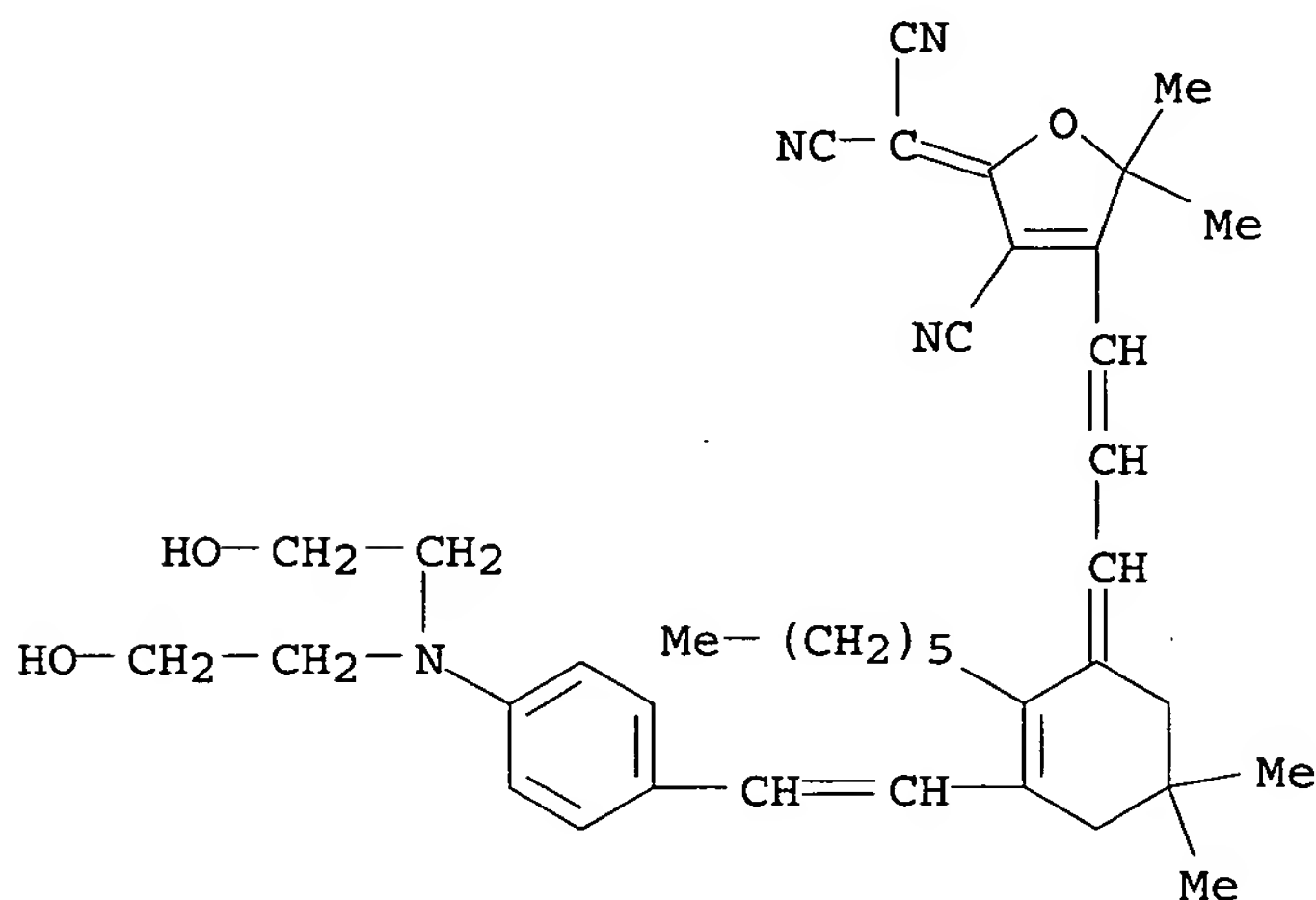


PAGE 2-A



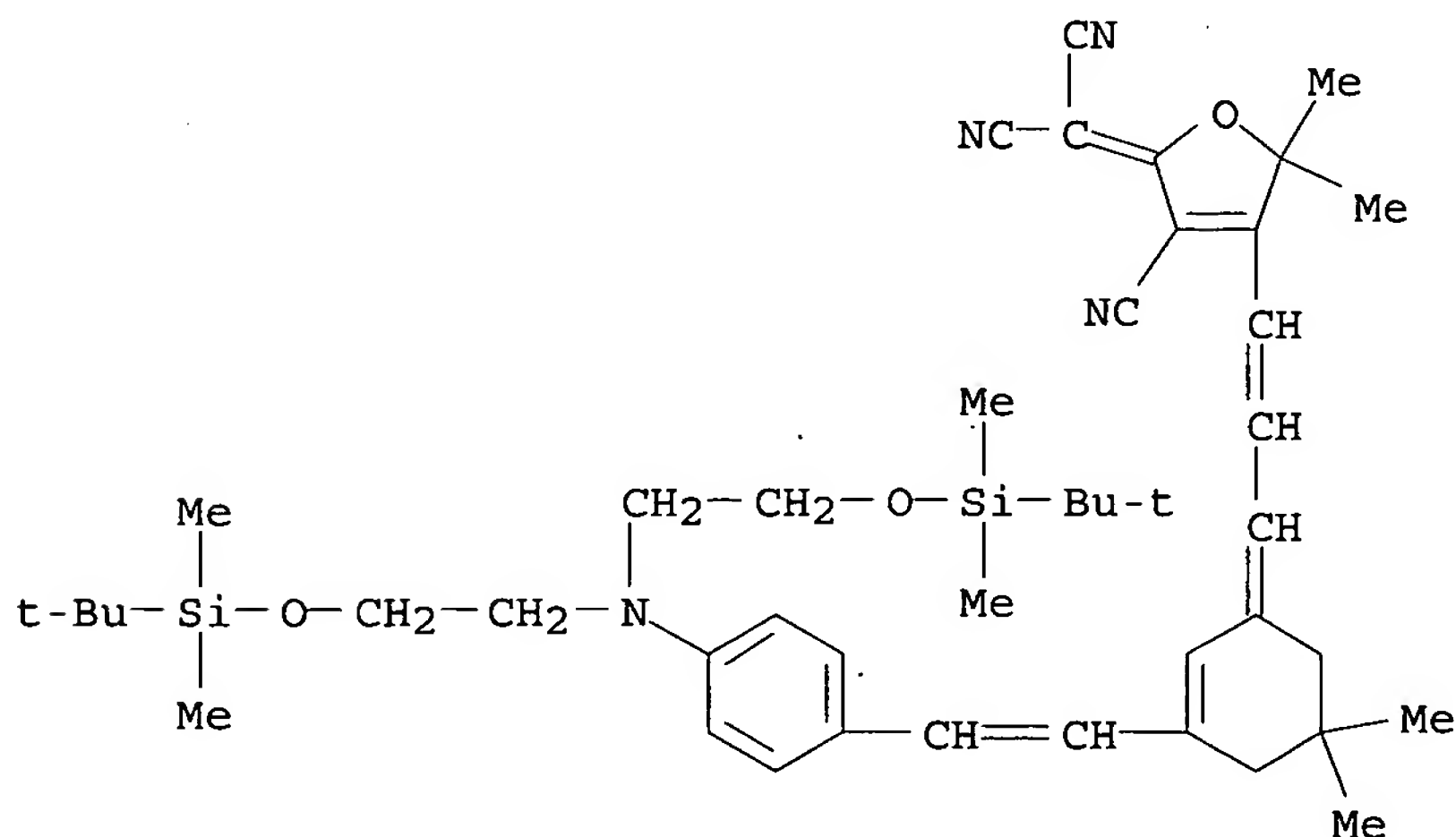
RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT: 38 THERE ARE 38 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 91 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:191339 HCAPLUS

DOCUMENT NUMBER: 135:53068

TITLE: Electro-optic polymer integrated optic devices for  
space applications

AUTHOR(S): Bechtel, James H.; Lin, Weiping; Shi, Yongqiang;  
Yacoubian, Araz

CORPORATE SOURCE: IPITEK, Carlsbad, CA, 92008, USA

SOURCE: Proceedings of SPIE-The International Society for  
Optical Engineering (2000), 4134(Photonics for Space  
Environments VII), 46-55

CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

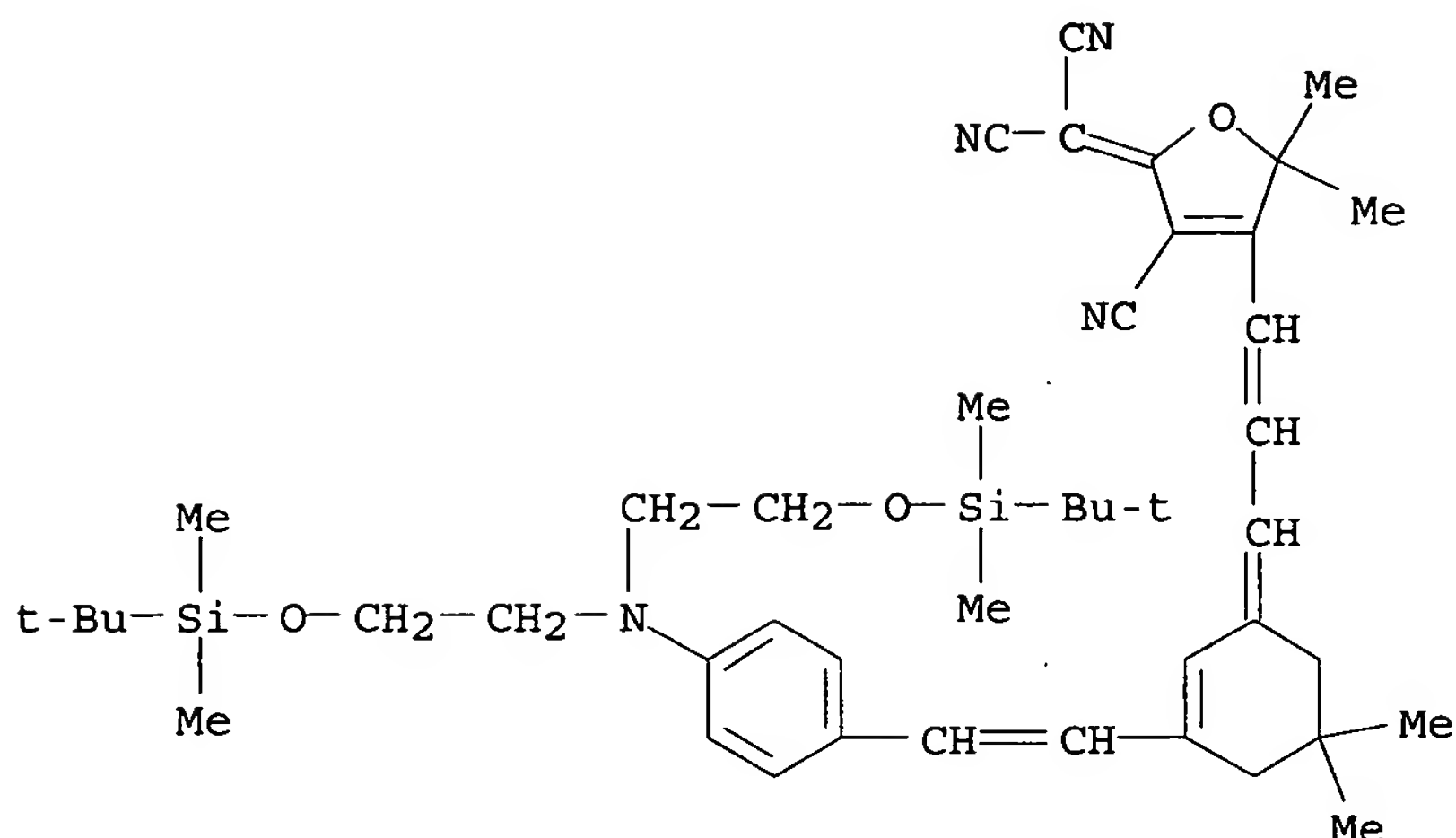
AB Recent developments in electrooptic polymer materials and devices led to  
new opportunities for integrated optic devices in space environments. The  
results of numerous tests indicated that polymer materials have many  
properties that are suitable to be used in space. These results coupled  
with recent advances in device and material technol. will allow large  
bandwidth modulators and switches with drive voltages <1 V. At IPITEK,  
the authors have already designed and fabricated new polymeric modulators  
with half-wave voltages <0.8 V and a half-wave voltage- interaction  
product of 2.2 V-cm. The low drive voltage allows electrooptic modulators  
and switches to be driven directly by high-speed logic devices without the  
use of broadband amplifiers.

IT 266348-41-8, Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-  
dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-  
cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-  
RL: DEV (Device component use); MOA (Modifier or additive use); USES  
(Uses)

(in electrooptic polymer integrated optic devices for space  
applications)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-  
dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-  
cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-  
(9CI) (CA INDEX NAME)



REFERENCE COUNT: 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 92 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2001:189726 HCAPLUS

DOCUMENT NUMBER: 135:257756

TITLE: Synthesis of new second-order nonlinear optical chromophores: implementing lessons learned from theory and experiment

AUTHOR(S): Zhang, Cheng H.; Todorova, Galina; Wang, Chuanguang; Londergan, Timothy; Dalton, Larry Raymond

CORPORATE SOURCE: Dept. of Chemistry, U. of Southern California, Los Angeles, CA, 90089-1062, USA

SOURCE: Proceedings of SPIE-The International Society for Optical Engineering (2000), 4114(Photonic Devices and Algorithms for Computing II), 77-87  
CODEN: PSISDG; ISSN: 0277-786X

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Studies on the influence of chromophore geometry on electro-optic (EO) coefficient/loading d. and poling efficiency reveal that chromophore optical loading d. is largely defined by the shape of the center of chromophore, and bulky groups at the end of chromophore is not preferable for most efficient poling of chromophore dipole. An EO coefficient of 122 pm/V at 1.06  $\mu\text{m}$  has been achieved as a result of the systematic chromophore geometry optimization. Even high EO coeffs. are expected to realized in the near future. Practical Mach-Zehnder modulators have been fabricated using CLD-1/APC material and have shown good dynamic thermal stability (120°), low optical loss (1.67 dB/cm at 1.55  $\mu\text{m}$ ), low modulation voltage (2.4 V, 2 cm modulation length), and high extinction ratio (26 dB).

IT 266348-41-8P

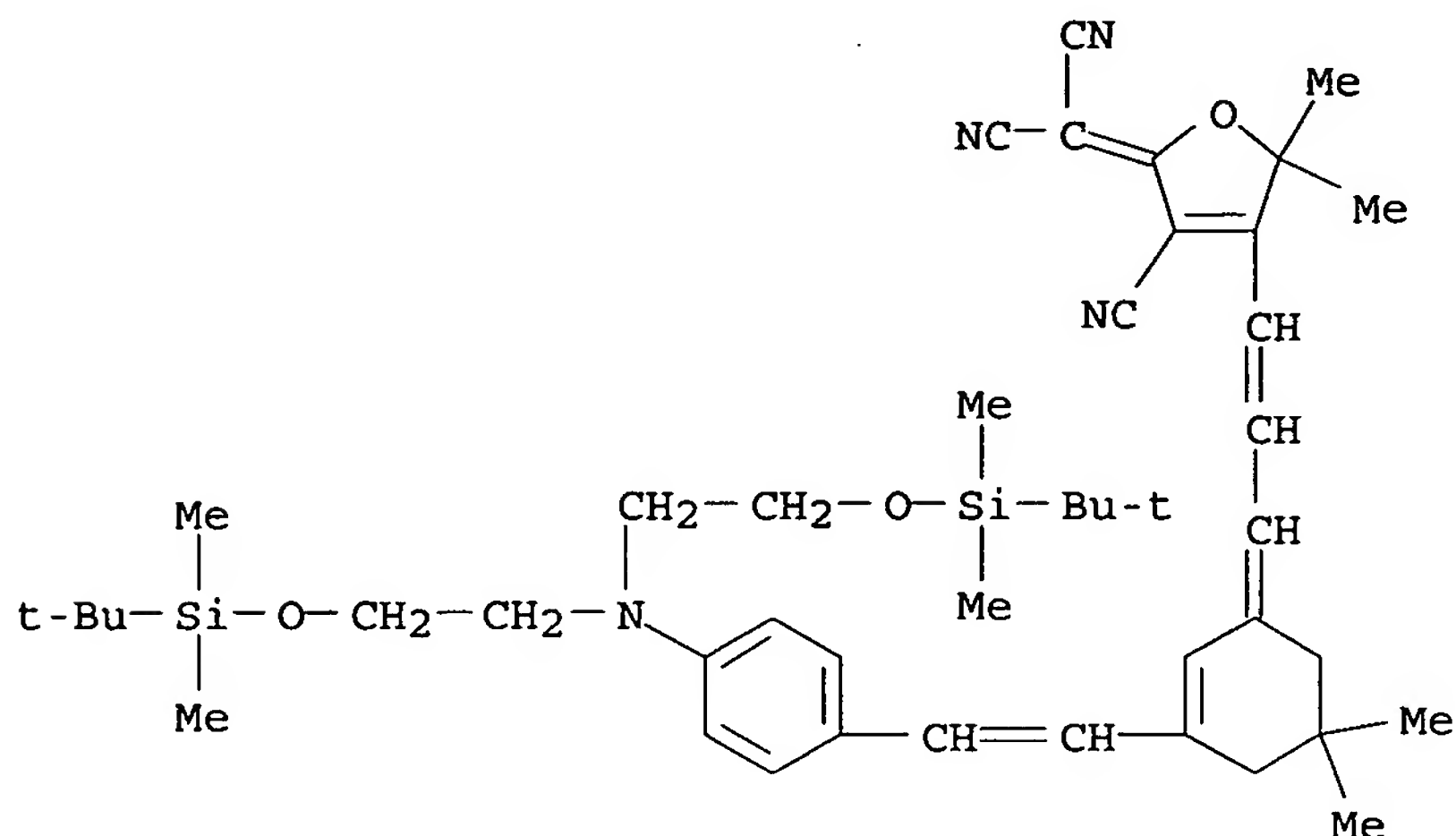
RL: MOA (Modifier or additive use); PRP (Properties); RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent); USES (Uses)

(chromophore; synthesis of new second-order nonlinear optical chromophores)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[(1,1-

dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

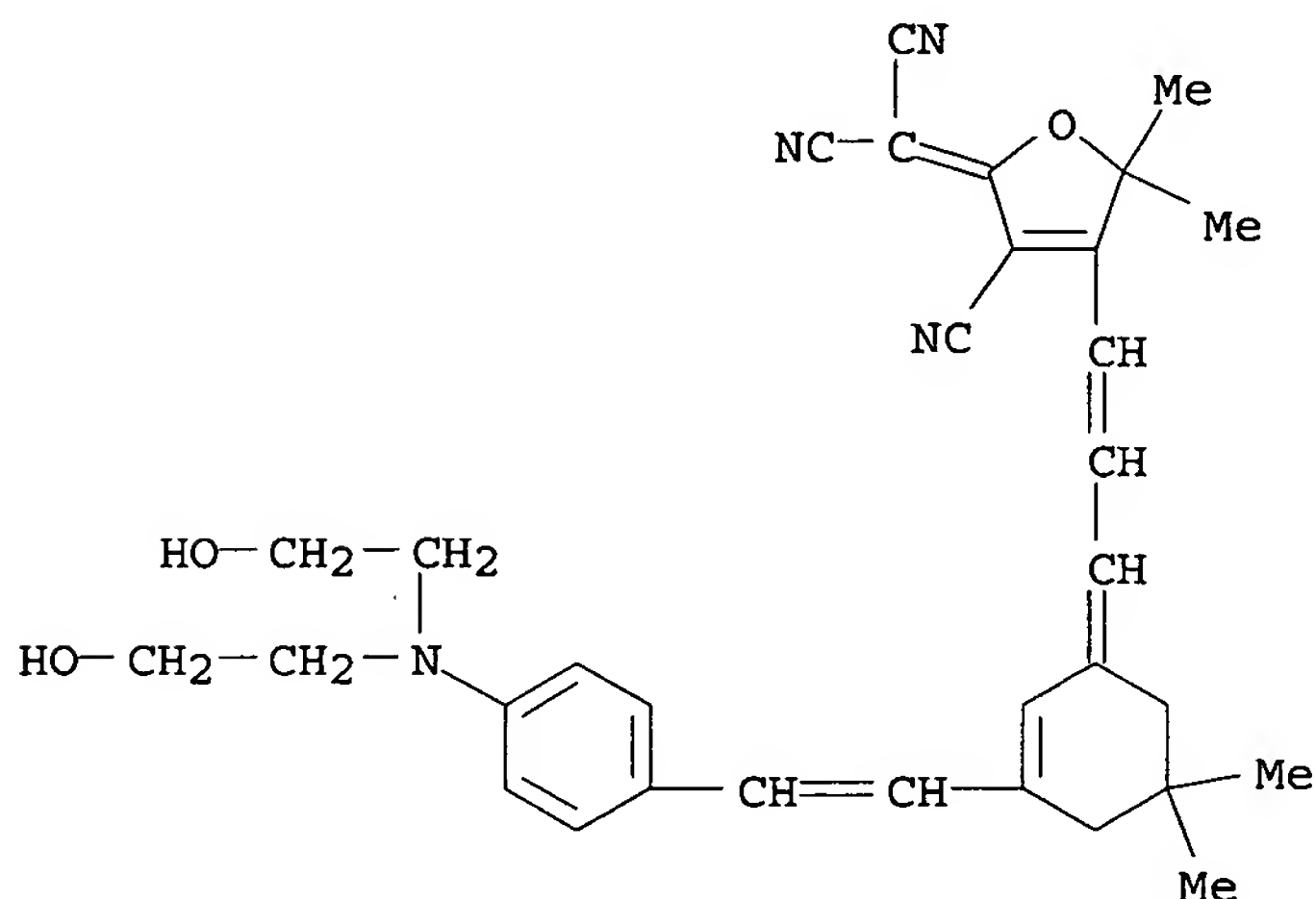


IT 224784-30-9P 265992-52-7P 265992-53-8P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(chromophore; synthesis of new second-order nonlinear optical chromophores)

RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

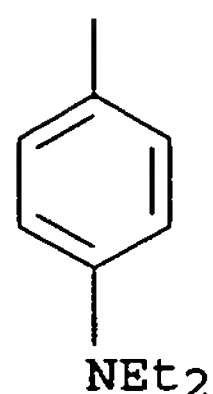


RN 265992-52-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



PAGE 2-A



REFERENCE COUNT: 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 93 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:876115 HCAPLUS

DOCUMENT NUMBER: 134:179119

TITLE: Progress toward Device-Quality Second-Order Nonlinear Optical Materials. 4. A Trilink High  $\mu\beta$  NLO Chromophore in Thermoset Polyurethane: A "Guest-Host" Approach to Larger Electrooptic Coefficients

AUTHOR(S): Zhang, Cheng; Wang, Chuanguang; Dalton, Larry R.; Zhang, Hua; Steier, William H.

CORPORATE SOURCE: Loker Hydrocarbon Institute and Department of Chemistry, University of Southern California, Los Angeles, CA, 90089-1661, USA

SOURCE: Macromolecules (2001), 34(2), 253-261

CODEN: MAMOBX; ISSN: 0024-9297

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A tri-linkable thiophene-containing second-order nonlinear optical (NLO) chromophore [(HO)3FTC] was synthesized from a tri-linkable donor bridge and a tri-cyanofuran electron acceptor (TCF). The TCF acceptor was modified with two Bu groups which greatly increased solubility and processability of the trihydroxy-functionalized chromophore and inhibited strong chromophore-chromophore interaction. A thermal stability study of (HO)3FTC indicates that the free hydroxyl group located close to the cyano acceptor causes the chromophore to decompose at a much lower temperature than

FTC chromophores with no free hydroxyl groups. Significantly improved thermal stability of the chromophore in a polyurethane film was obtained by masking the free hydroxyl groups with toluene diisocyanate (TDI). Polyurethane prepolymer synthetic schemes were designed and studied in detail to improve elec. field induced dipole alignment. Enhancement of over 150% in poling efficiency was achieved by reducing the degree of chromophore attachment to the polymer backbone before applying an elec. poling field through a guest-host approach. It was critical to allow TDI and triethanolamine hydroxyl cross-linkers to react at higher temperature for a longer time to form a partially cross-linked prepolymer before the -NCO masked trilink chromophore was added. By anchoring chromophores to a three-dimensional cross-linked polyurethane network at three points, the thermal stability of poling-induced electrooptic activity was enhanced by 33°.

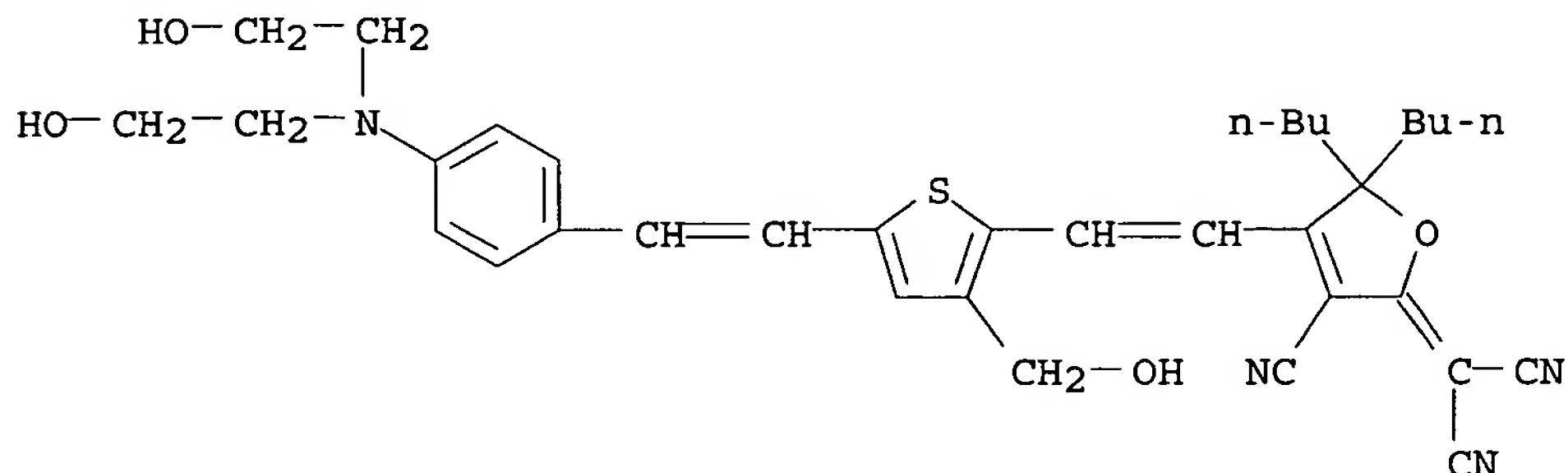
IT 268548-55-6P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

((HO)3FTC chromophore, intermediate; preparation of triisocyanate-thiophene chromophore and incorporation to TDI-TEA prepolymer to obtain polyurethane second-order NLO with high poling efficiency)

RN 268548-55-6 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3-(hydroxymethyl)-2-thienyl]ethenyl]-5,5-dibutyl-3-cyano-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



IT 326597-51-7P

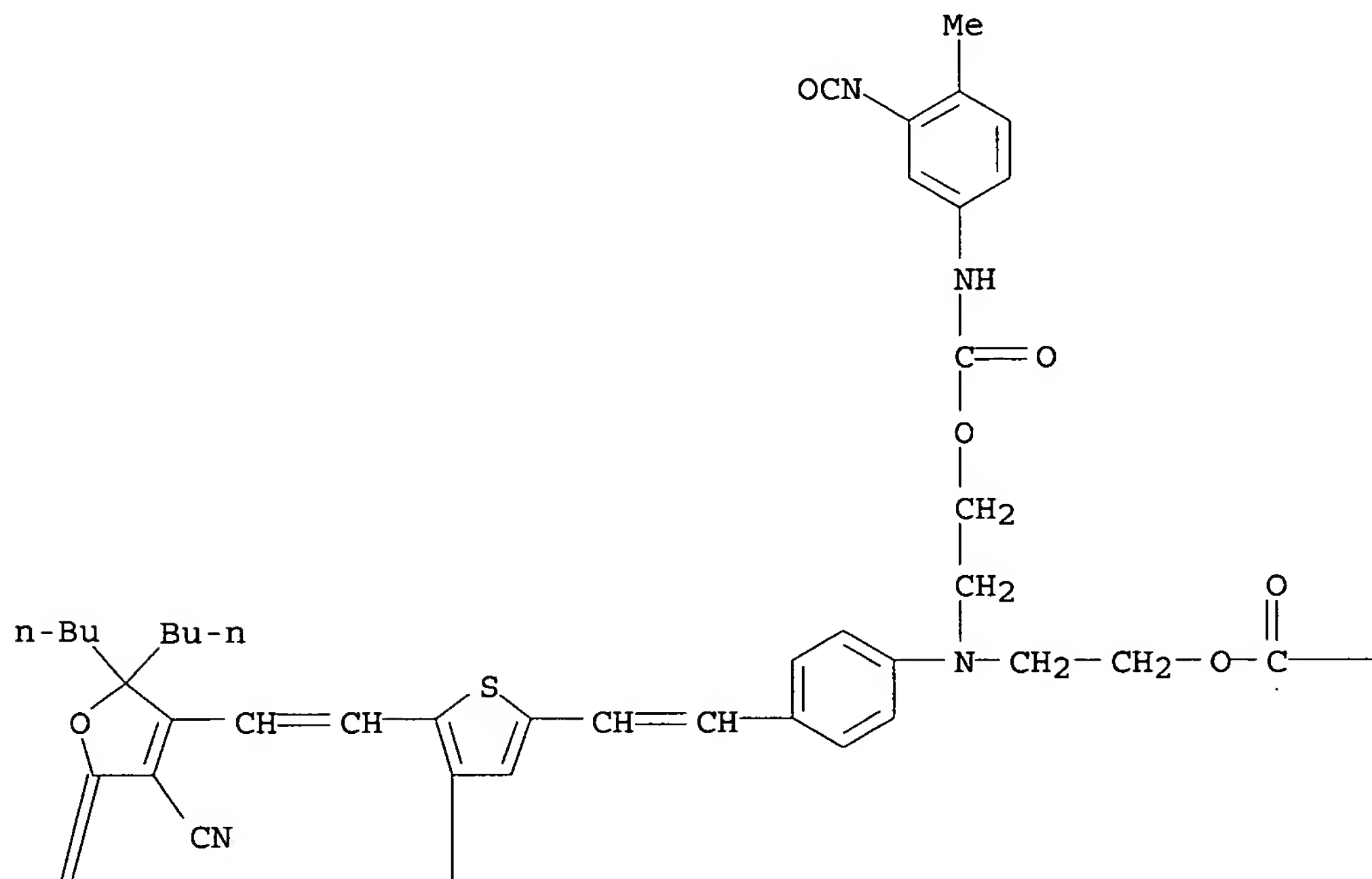
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(monomer, trifunctionalized chromophore; preparation of triisocyanate-thiophene chromophore and incorporation to TDI-TEA prepolymer to obtain polyurethane second-order NLO with high poling efficiency)

RN 326597-51-7 HCAPLUS

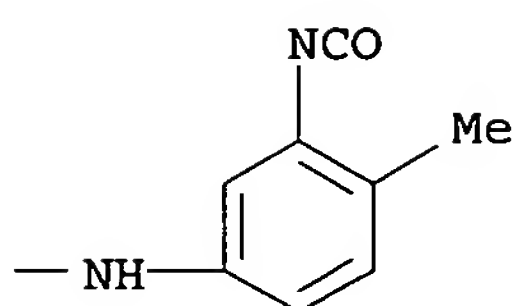
CN Carbamic acid, (3-isocyanato-4-methylphenyl)-, [[4-[2-[5-[2-[2,2-dibutyl-4-cyano-5-(dicyanomethylene)-2,5-dihydro-3-furanyl]ethenyl]-4-[[[(3-isocyanato-4-methylphenyl)amino]carbonyl]oxy]methyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

PAGE 1-A

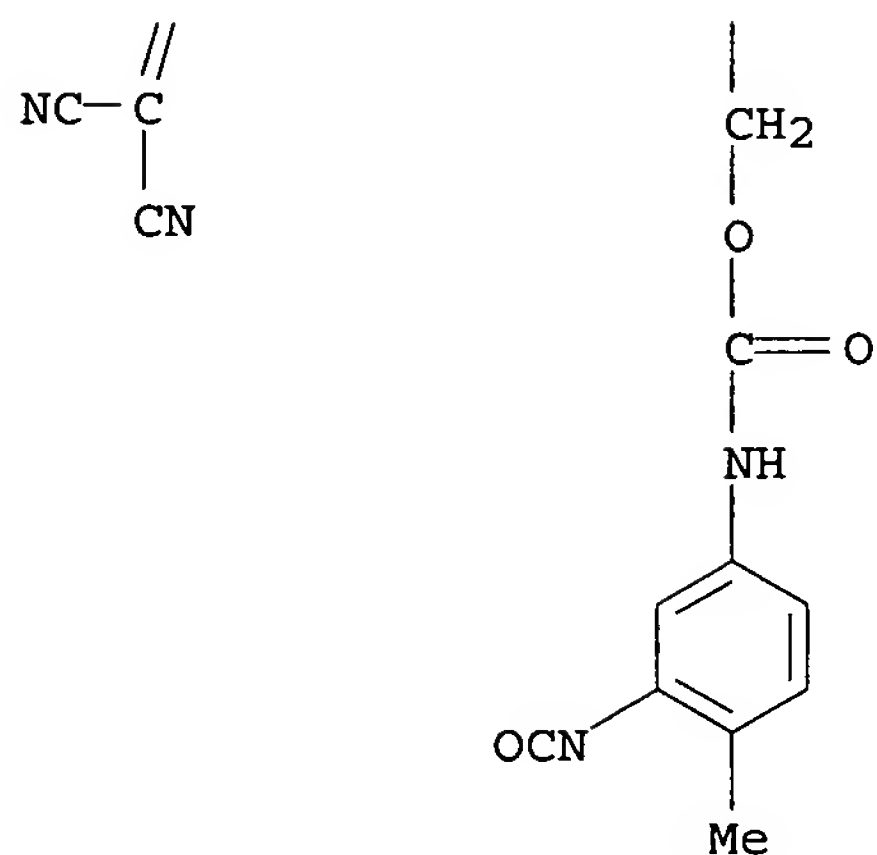




PAGE 1-B



PAGE 2-A



IT 326597-52-8P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(polyurethane; preparation of triisocyanate-thiophene chromophore and  
incorporation to TDI-TEA prepolymer to obtain polyurethane second-order  
NLO with high poling efficiency)

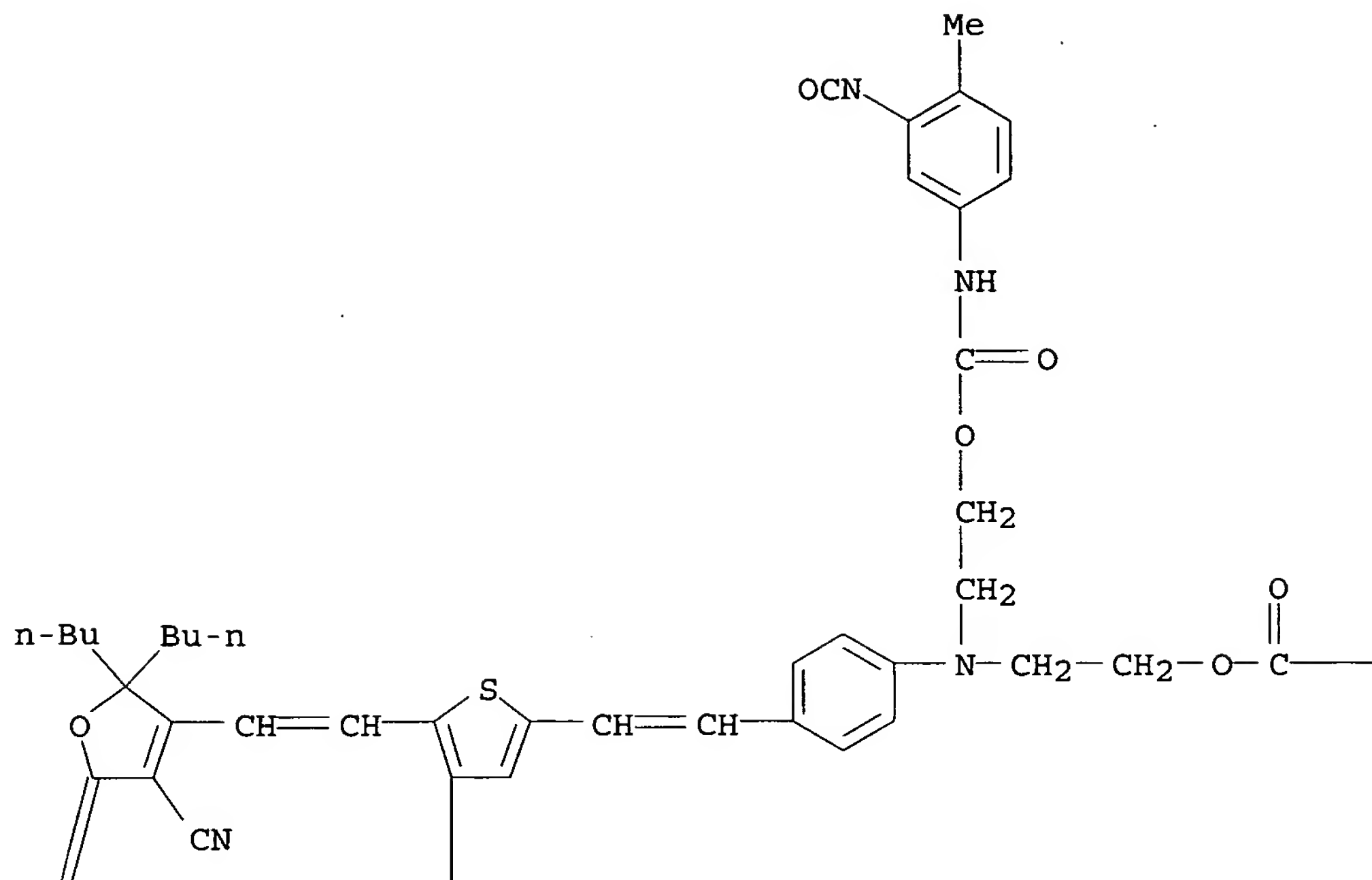
RN 326597-52-8 HCAPLUS

CN Carbamic acid, (3-isocyanato-4-methylphenyl)-, [[4-[2-[5-[2-[2,2-dibutyl-4-cyano-5-(dicyanomethylene)-2,5-dihydro-3-furanyl]ethenyl]-4-[[[(3-isocyanato-4-methylphenyl)amino]carbonyl]oxy]methyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester, polymer with 2,4-diisocyanato-1-methylbenzene and 2,2',2''-nitrilotris[ethanol] (9CI)  
(CA INDEX NAME)

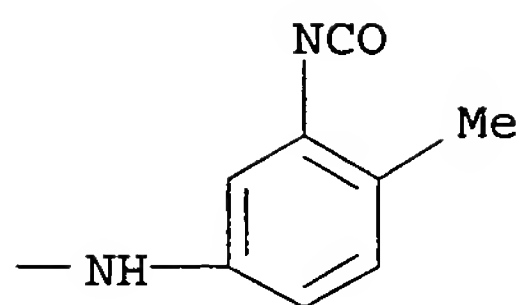
CM 1

CRN 326597-51-7  
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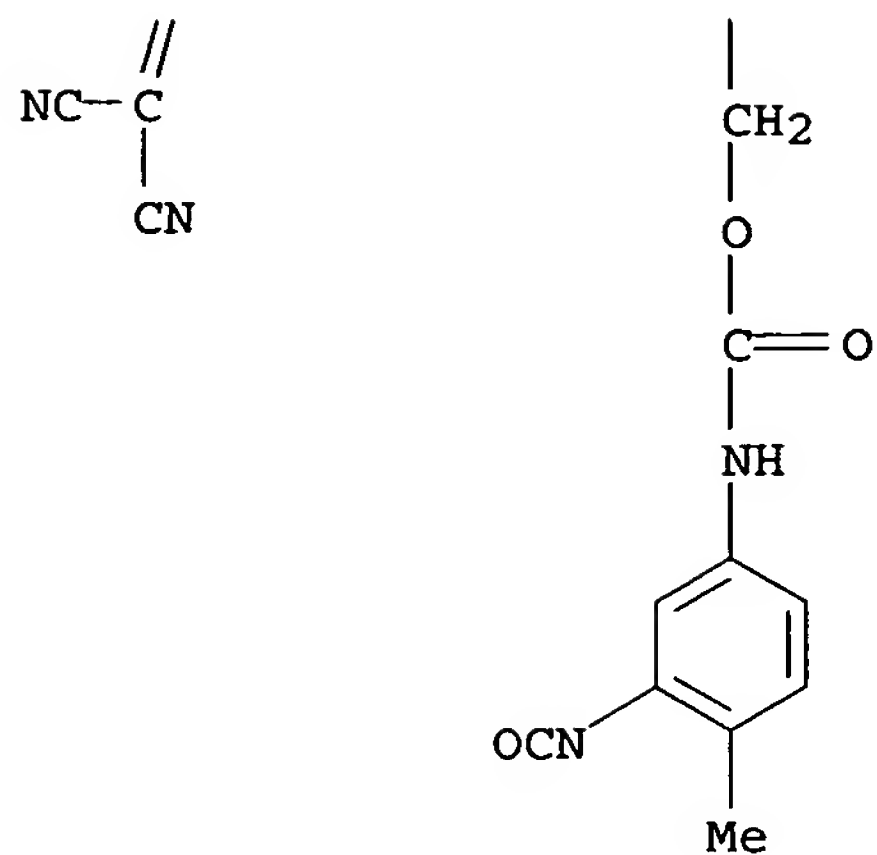
PAGE 1-A



PAGE 1-B



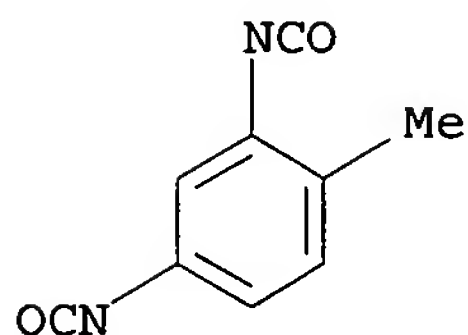
PAGE 2-A



CM 2

CRN 584-84-9

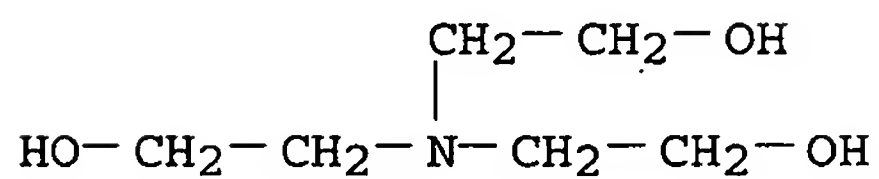
CMF C9 H6 N2 O2



CM 3

CRN 102-71-6

CMF C6 H15 N O3



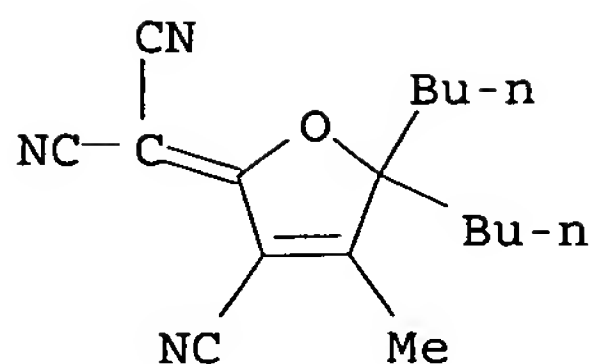
IT 326597-50-6, 3-Cyano-5,5-dibutyl-2-dicyanomethylene-4-methyl-2,5-dihydrofuran

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of triisocyanate-thiophene chromophore and incorporation to TDI-TEA prepolymer to obtain polyurethane second-order NLO with high poling efficiency)

RN 326597-50-6 HCAPLUS

CN Propanedinitrile, (5,5-dibutyl-3-cyano-4-methyl-2(5H)-furanylidene) - (9CI)  
(CA INDEX NAME)



REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 94 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:876113 HCAPLUS

DOCUMENT NUMBER: 134:179118

TITLE: Electric Poling and Relaxation of Thermoset Polyurethane Second-Order Nonlinear Optical Materials: Role of Cross-Linking and Monomer Rigidity

AUTHOR(S): Zhang, Cheng; Wang, Chuanguang; Yang, Jinglin; Dalton, Larry R.; Sun, Guilin; Zhang, Hua; Steier, William H.

CORPORATE SOURCE: Loker Hydrocarbon Institute and Department of Chemistry, University of Southern California, Los Angeles, CA, 90089-1062, USA

SOURCE: Macromolecules (2001), 34(2), 235-243

CODEN: MAMOBX; ISSN: 0024-9297

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A high dipole alignment  $\mu\beta$  isophorone-derived phenyltetraene chromophore (denoted CLD-5) was synthesized. The chromophore was modified with a hexyl group at the middle of the  $\pi$ -conjugate bridge to improve solubility and processability and was dihydroxy-functionalized for covalent incorporation into various cross-linked polyurethane (PU) systems. The elec. poling and relaxation of the chromophore in PU thin films were studied. First, the chromophore was incorporated into conventional TDI/TEA polyurethane, and an electrooptic (EO) coefficient of 57.6 pm/V at 1.06  $\mu\text{m}$  was obtained, which is 28% higher than that obtained from nonhexylated chromophore (CLD-2) in the same PU system. Two polyurethane systems, poly[(Ph isocyanate)-co-formaldehyde] (PPIF)/triethanolamine (TEA) and PPIF/bisphenyl-1,1'-dimethanol (BPDM), were designed to study the influence of cross-link d. and monomer rigidity on elec. field poling of chromophore dipoles and relaxation behavior of poling-induced chromophore alignment. The CLD-5/PPIF/TEA polymer has the highest crosslink d. (3.07 mmol/g) among all the polyurethanes studied. It gains 38° in thermal stability but loses 50% of EO activity as compared with the CLD-5/TDI/TEA polyurethane material, which has a cross-link d. of 1.91 mmol/g. A higher EO coefficient (41 pm/V), lower optical loss of 2.56 dB/cm at 1.3  $\mu\text{m}$ , and the highest dynamic stability (133°) were obtained for the CLD-5/PPIF/BPDM polyurethane EO material, which has the lowest cross-link d. (1.27 mmol/g) and the most rigid monomers. The results indicate that excessive crosslinking deteriorates elec. poling of long chromophores in a cross-linked polymer thin film. Therefore, crosslinking by itself is not necessarily a good approach to achieving high thermal stability of elec. field-induced chromophore alignment in polyurethane systems.

IT 266348-40-7P

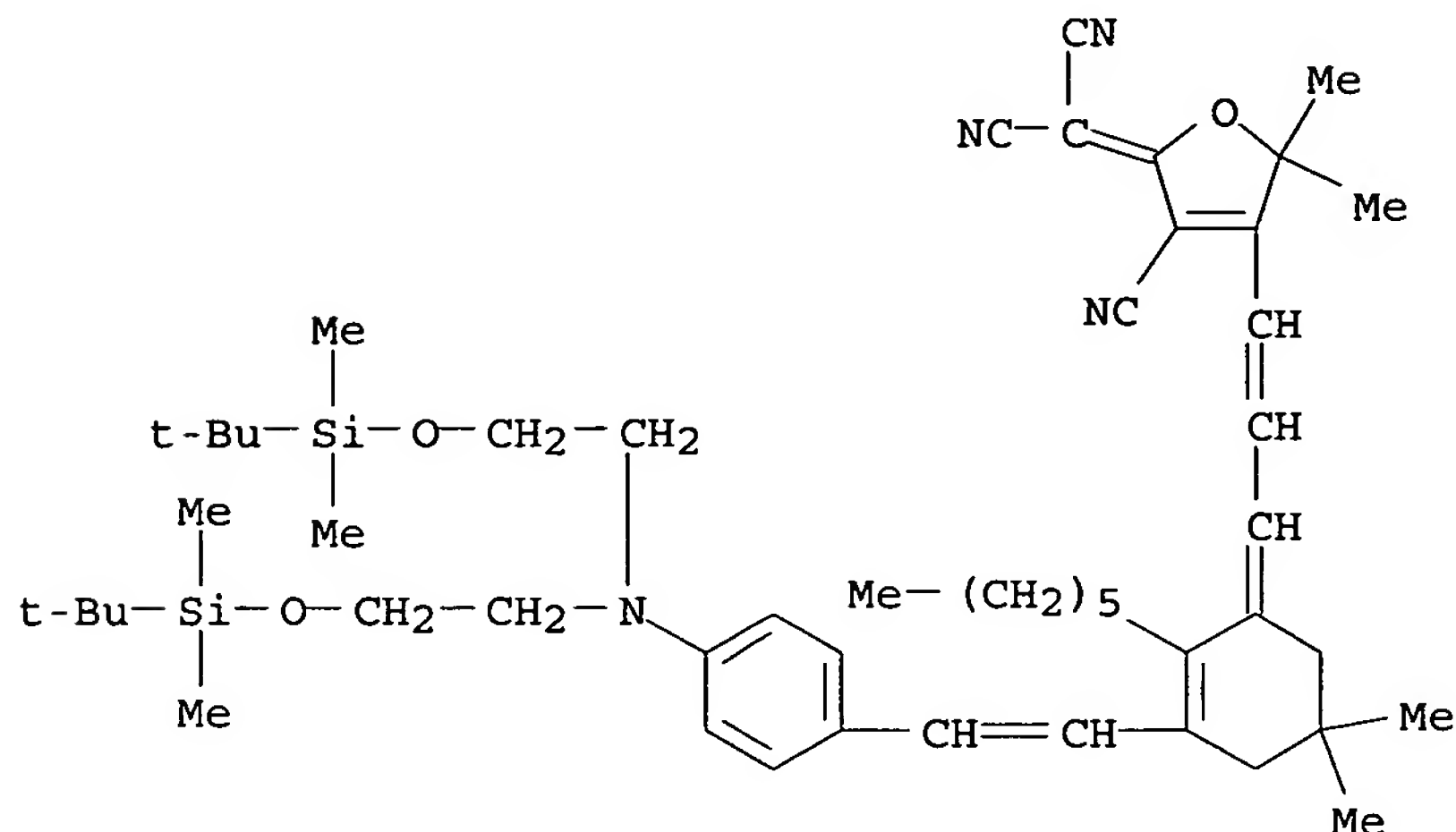
RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(CDL-4, intermediate; preparation of conjugated phenylene-polyurethane

networks and simultaneous elec. poling and crosslinking effects on electrooptic response)

RN 266348-40-7 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



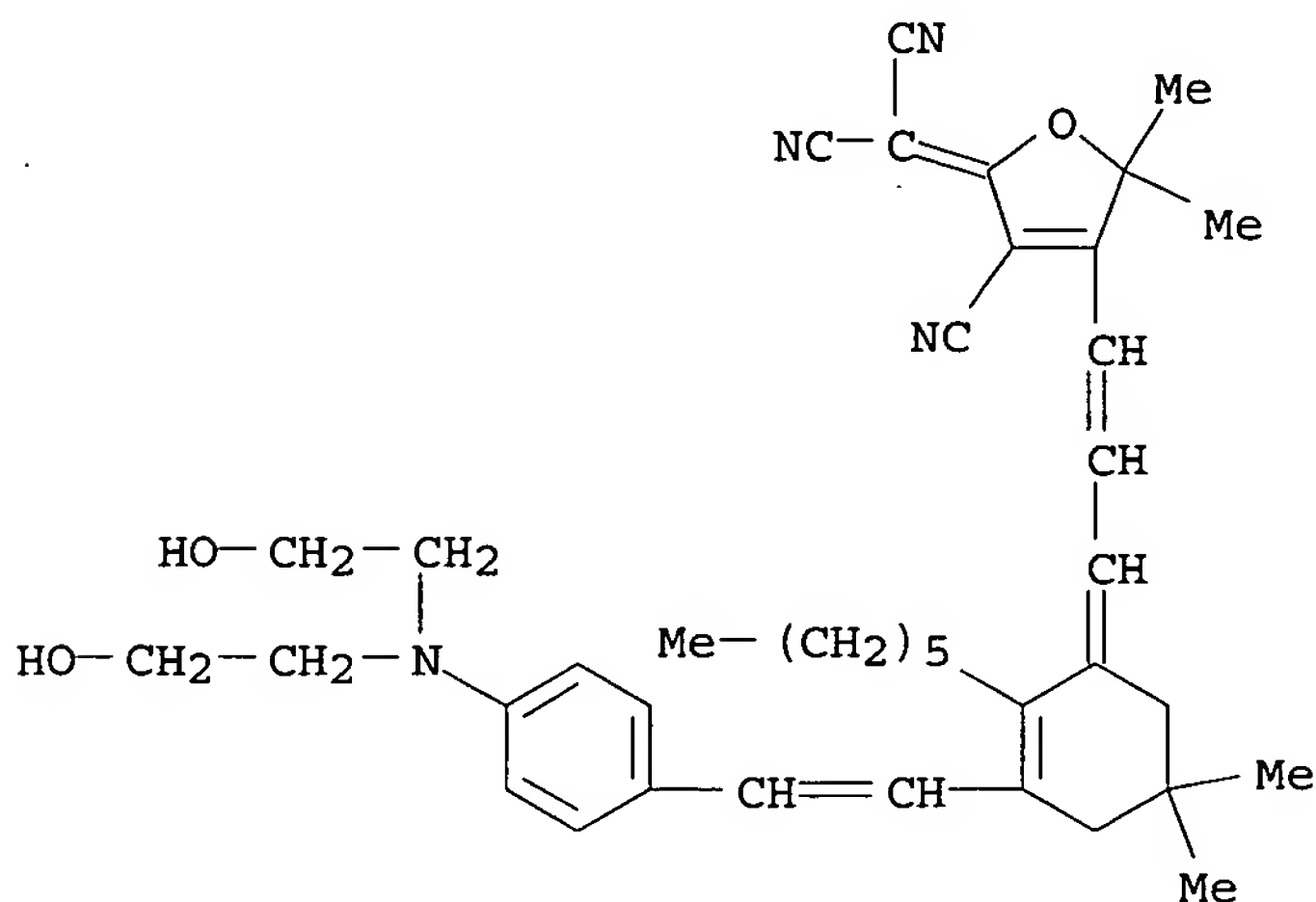
IT 259653-88-8P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT (Reactant or reagent)

(CDL-5, chromophore monomer; preparation of conjugated phenylene-polyurethane networks and simultaneous elec. poling and crosslinking effects on electrooptic response)

RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



IT 326597-44-8P 326597-45-9P 326597-46-0P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of conjugated phenylene-polyurethane networks and simultaneous  
 elec. poling and crosslinking effects on electrooptic response)

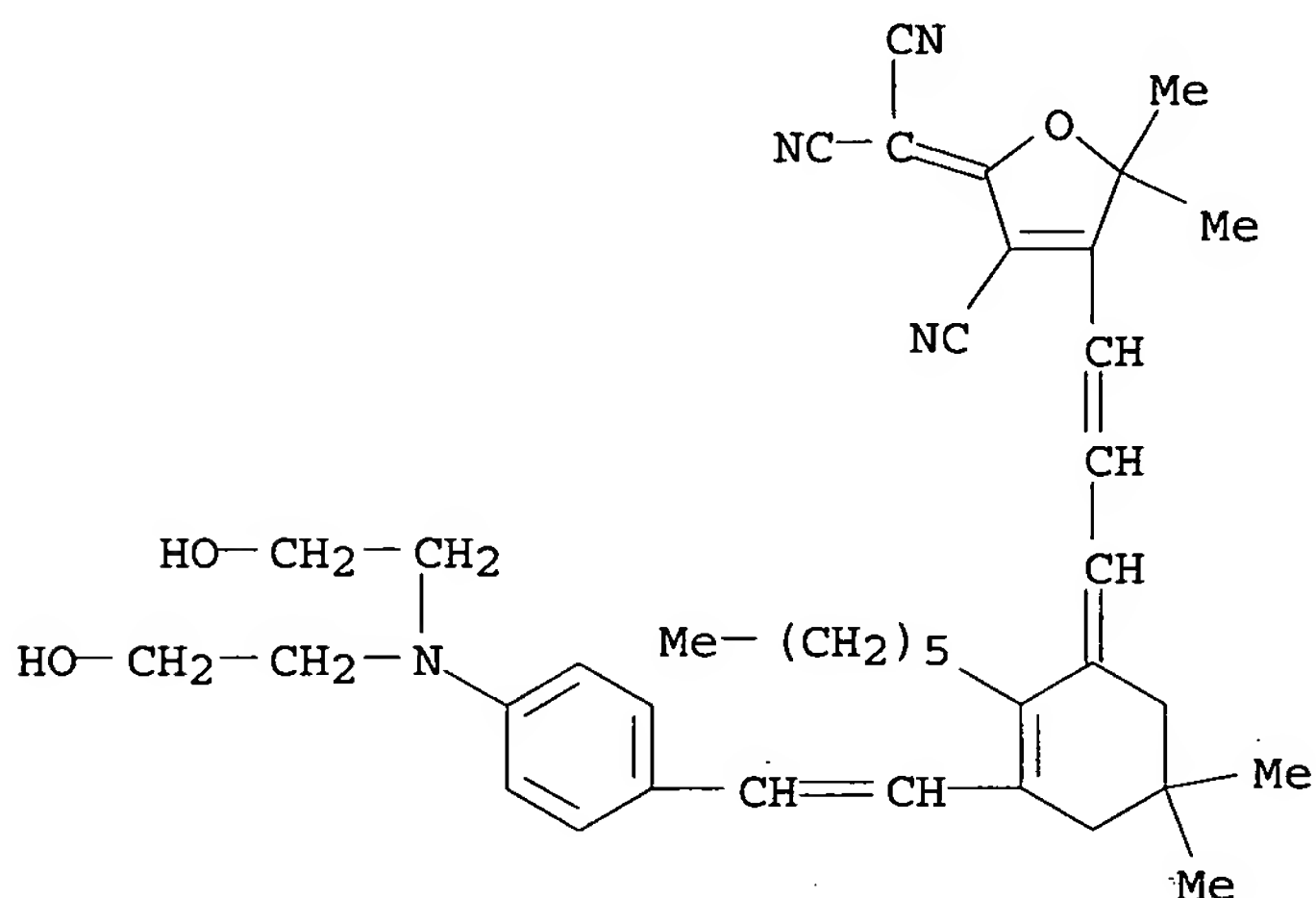
RN 326597-44-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-  
 2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-  
 dimethyl-2(5H)-furanlydene]-, polymer with 1,3-diisocyanatomethylbenzene  
 and 2,2',2''-nitrilotris[ethanol] (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

CMF C39 H48 N4 O3

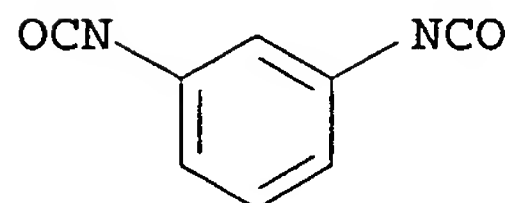


CM 2

CRN 26471-62-5

CMF C9 H6 N2 O2

CCI IDS

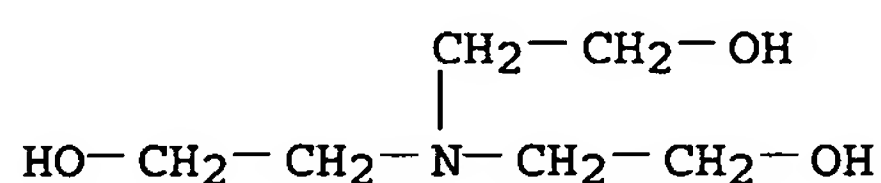


D1-Me

CM 3

CRN 102-71-6

CMF C6 H15 N O3



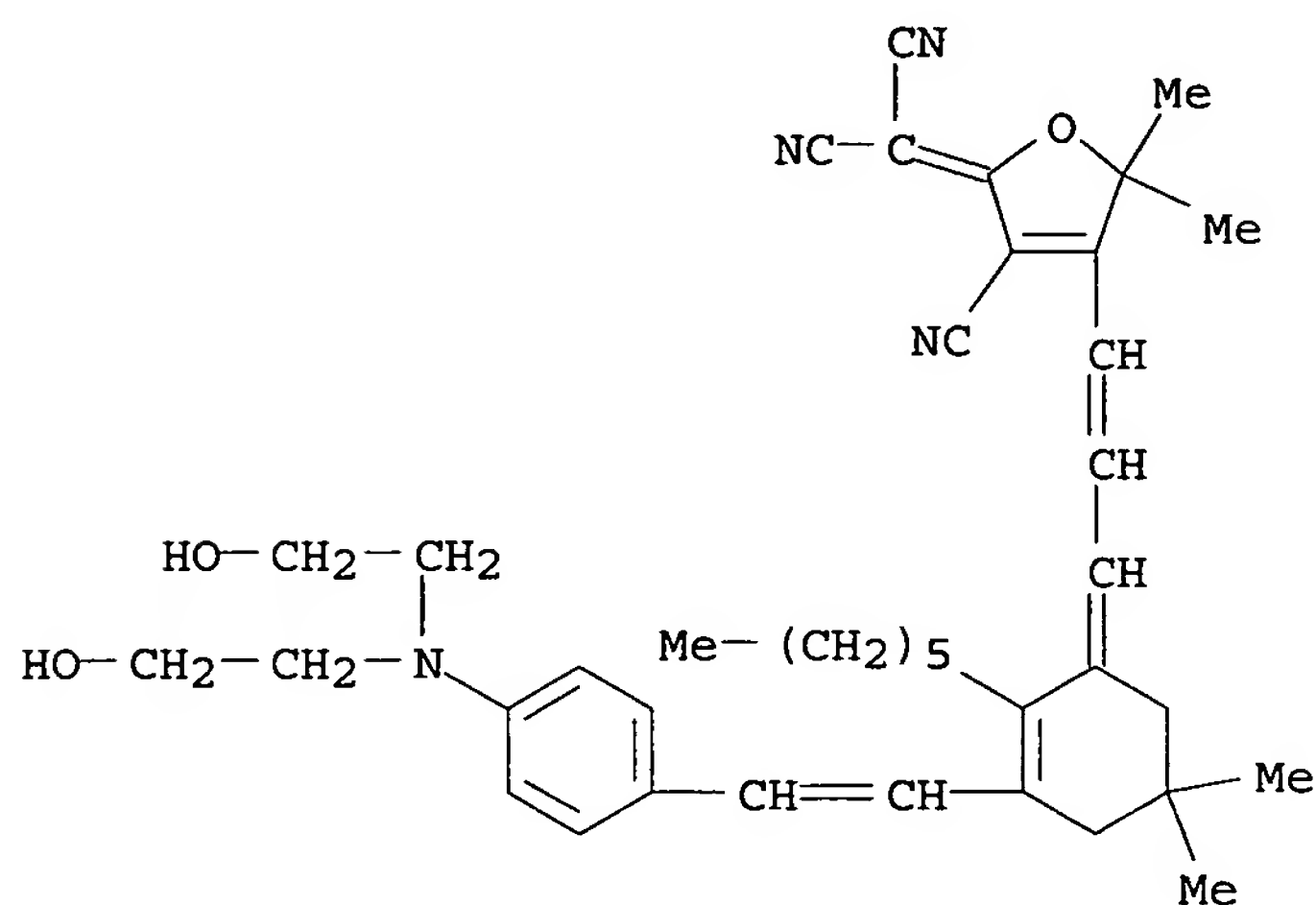
RN 326597-45-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-, polymer with formaldehyde, isocyanatobenzene and 2,2',2''-nitrilotris[ethanol] (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

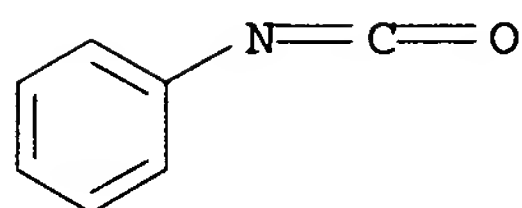
CMF C39 H48 N4 O3



CM 2

CRN 103-71-9

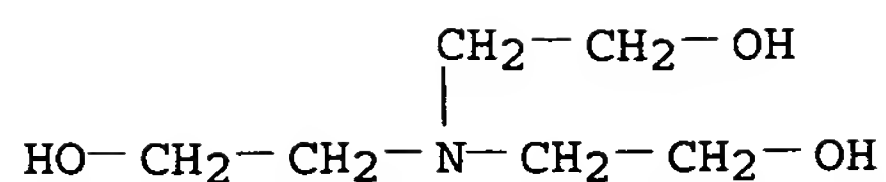
CMF C7 H5 N O



CM 3

CRN 102-71-6

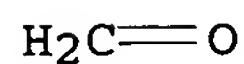
CMF C6 H15 N O3



CM 4

CRN 50-00-0

CMF C H2 O



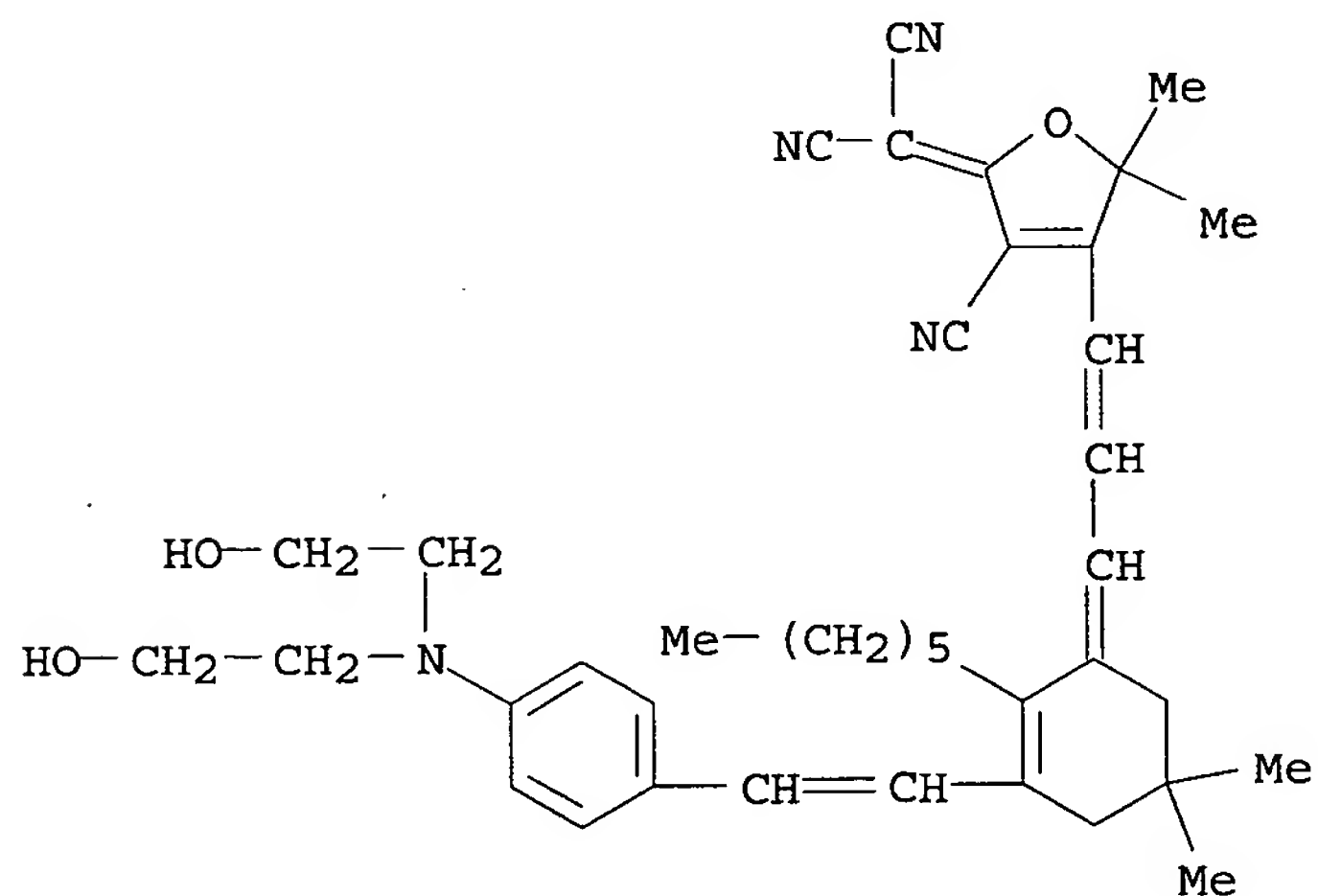
RN 326597-46-0 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-, polymer with [1,1'-biphenyl]-2,2'-dimethanol, formaldehyde and isocyanatobenzene (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

CMF C39 H48 N4 O3

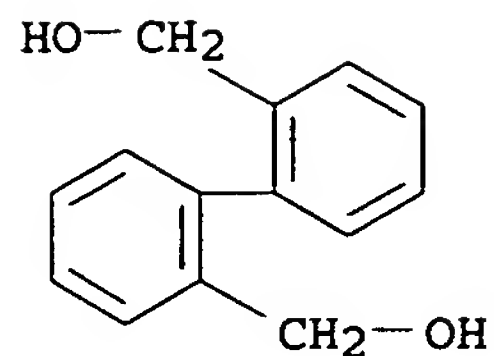


CM 2

CRN 3594-90-9

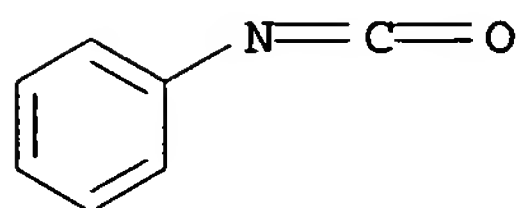
CMF C14 H14 O2





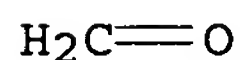
CM 3

CRN 103-71-9  
CMF C7 H5 N O



CM 4

CRN 50-00-0  
CMF C H2 O



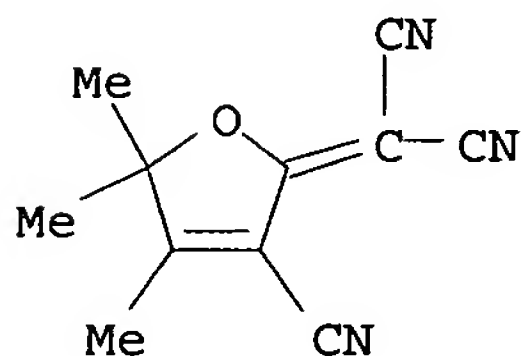
IT 171082-32-9, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of conjugated phenylene-polyurethane networks and simultaneous elec. poling and crosslinking effects on electrooptic response)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanlydene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT:

28

THERE ARE 28 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 95 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:819790 HCAPLUS

DOCUMENT NUMBER: 134:107667

TITLE: Low halfwave voltage electrooptic polymer modulator technology

AUTHOR(S) : Shi, Yongqiang; Lin, Weiping; Olson, David J.;  
Bechtel, James H.

CORPORATE SOURCE: TACAN Corporation, Carlsbad, CA, 92008, USA

SOURCE: Materials Research Society Symposium Proceedings  
(2000), 598(Electrical, Optical, and Magnetic  
Properties of Organic Solid-State Materials V),  
BB4.5/1-BB4.5/9  
CODEN: MRSPDH; ISSN: 0272-9172

PUBLISHER: Materials Research Society

DOCUMENT TYPE: Journal

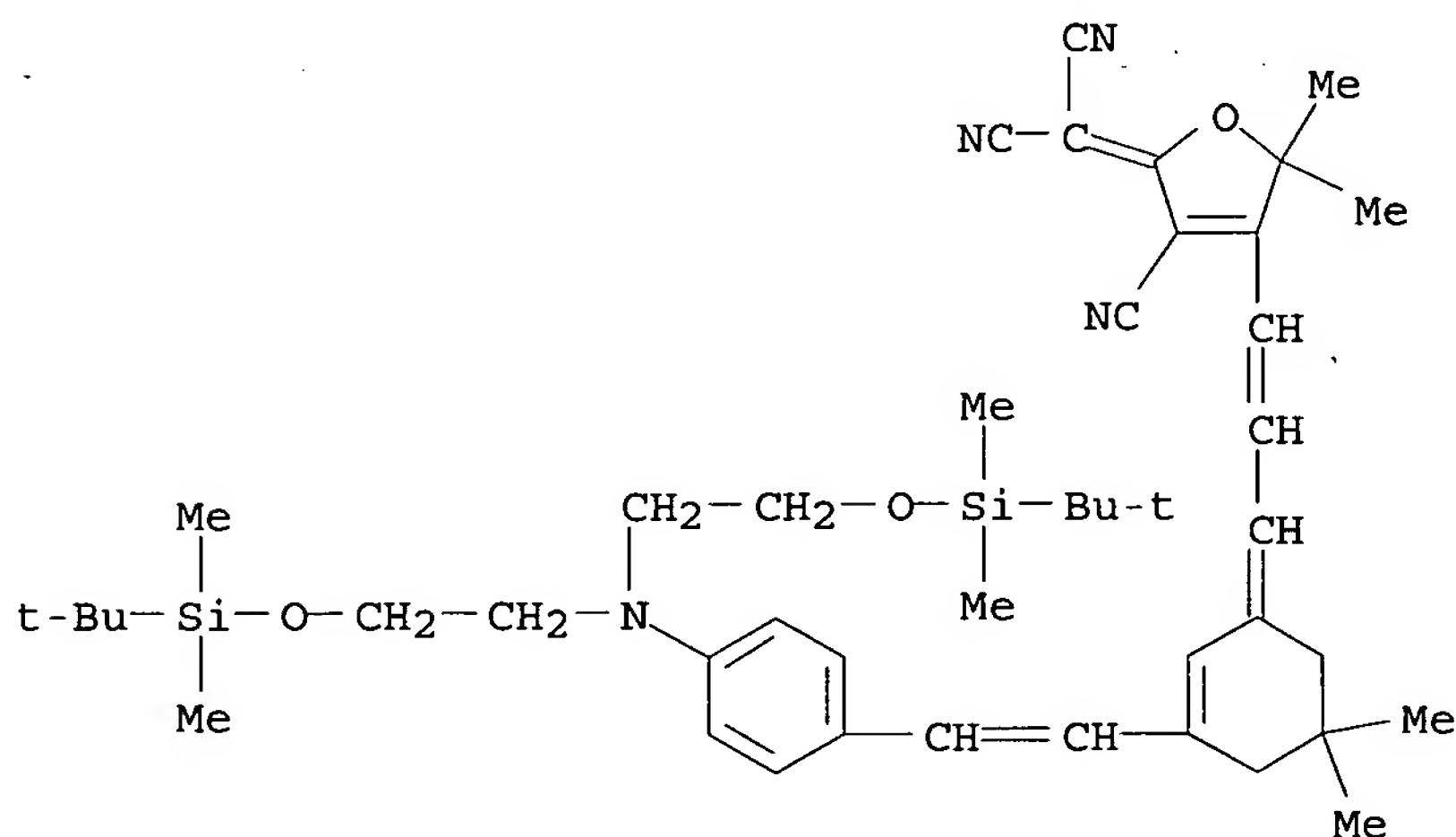
LANGUAGE: English

AB The recent development in nonlinear optical polymer materials and device  
fabrication technologies has resulted in a significantly reduced halfwave  
voltage for high-speed optical communications. Optical push-pull and  
active cladding approaches are discussed for low halfwave voltage  
electrooptic polymer modulator design and fabrication. Based on these new  
designs, exptl. polymer modulators were fabricated and a halfwave  
voltage-interaction length product of 2.2 V-cm was achieved using optical  
push-pull and a highly active electrooptic polymer system.

IT 266348-41-8  
RL: DEV (Device component use); MOA (Modifier or additive use); USES  
(Uses)  
(low halfwave voltage electrooptic polymer modulator of  
poly(methyl)methacrylate doped with)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-  
dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-  
cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-  
(9CI) (CA INDEX NAME)



REFERENCE COUNT: 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 96 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:566076 HCAPLUS

DOCUMENT NUMBER: 133:253068

TITLE: New NLO chromophores based on 2-amino-1,1,3-tricyano-1-  
propene acceptor

AUTHOR(S) : Todorova, Galina; Chen, Jinghong; Dalton, Larry R.

CORPORATE SOURCE: Department of Chemistry, Loker Hydrocarbon Institute,  
University of Southern California, Los Angeles, CA,  
900089-1661, USA

SOURCE: Polymeric Materials Science and Engineering (2000),  
83, 256-257  
CODEN: PMSEDG; ISSN: 0743-0515

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

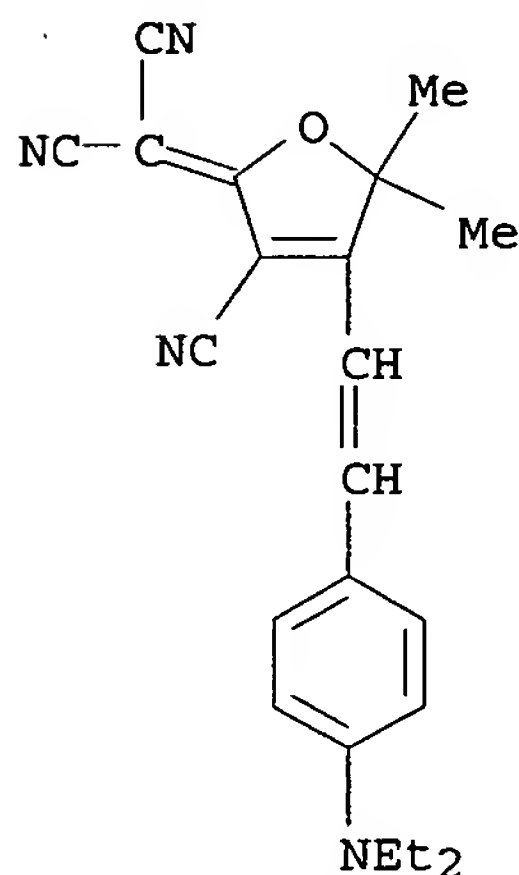
LANGUAGE: English

AB A novel acceptor, namely 2-amino-1,1,3-tricyano-1-propene has been used  
for synthesis of NLO (nonlinear optical) chromophores. Model chromophores  
has been synthesized in order to compare the acceptor's properties to the  
well-studied TCF (2-cyanomethylene-3-cyano-4,5,5-trimethyl-2,5-  
dihydrofuran) acceptor. TCF exhibits higher thermal stability but it is  
believed that both acceptors have similar electron-withdrawing abilities.

IT 296280-34-7P  
RL: MOA (Modifier or additive use); PRP (Properties); SPN (Synthetic  
preparation); PREP (Preparation); USES (Uses)  
(preparation of new nonlinear optical chromophores based on  
2-amino-1,1,3-tricyano-1-propene acceptor)

RN 296280-34-7 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-  
dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 97 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:448984 HCAPLUS

DOCUMENT NUMBER: 133:170009

TITLE: Electro-optic polymer modulators with 0.8 V half-wave  
voltage

AUTHOR(S): Shi, Yongqiang; Lin, Weiping; Olson, David J.;  
Bechtel, James H.; Zhang, Hua; Steier, William H.;  
Zhang, Cheng; Dalton, Larry R.

CORPORATE SOURCE: TACAN Corporation, Carlsbad, CA, 92008, USA

SOURCE: Applied Physics Letters (2000), 77(1), 1-3  
CODEN: APPLAB; ISSN: 0003-6951

PUBLISHER: American Institute of Physics

DOCUMENT TYPE: Journal

LANGUAGE: English

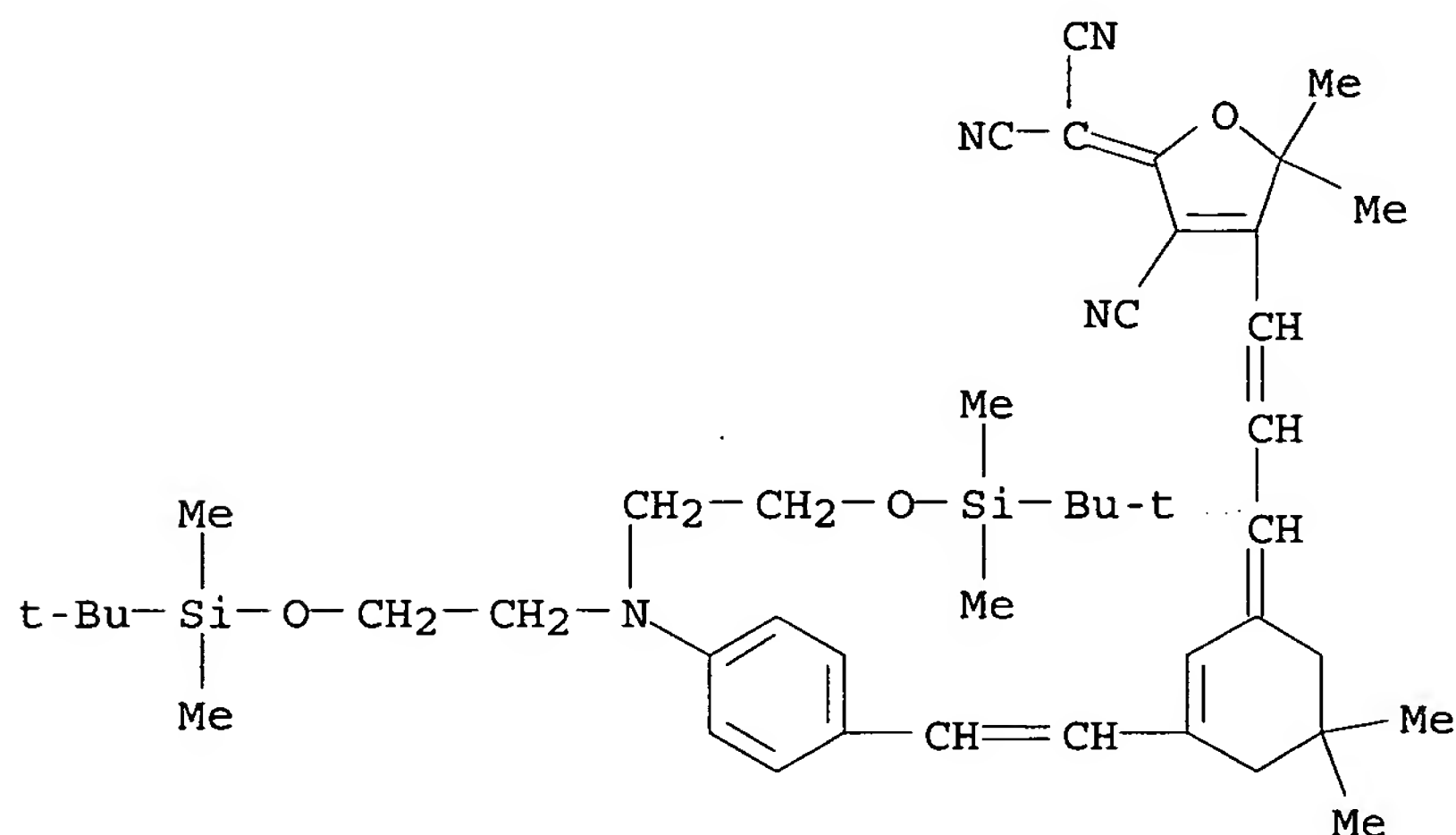
AB The authors report the fabrication and test results for polymeric electrooptic modulators with a half-wave voltage of 0.8 V and a half-wave voltage-interaction length product of 2.2 V cm. These modulators employ an optical push-pull architecture and are made from poly(methylmethacrylate) with a high mol. hyperpolarizability polyene bridge-type chromophore. An electrooptic coefficient of 58 pm/V was obtained at a 1318. nm wavelength. The guest-host polymer system exhibited a thermal stability to 75° and a relatively stable nonlinearity at ambient conditions. The exptl. results demonstrated not only the sub-1 V half-wave voltage electrooptic polymer modulator but also the potential of polymeric electrooptic materials for photonic applications.

IT 266348-41-8

RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(electro-optic polymer modulators with 0.8 V half-wave voltage)

RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT: 17 THERE ARE 17 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 98 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:387647 HCAPLUS

DOCUMENT NUMBER: 133:151541

TITLE: Electro-optic polymer modulators for 1.55  $\mu$ m wavelength using phenyltetraene bridged chromophore in polycarbonate

AUTHOR(S): Oh, Min-Cheol; Zhang, Hua; Szep, Attila; Chuyanov, Vadim; Steier, William H.; Zhang, Cheng; Dalton, Larry R.; Erlig, Hernan; Tsap, Boris; Fetterman, Harold R.

CORPORATE SOURCE: Department of Electrical Engineering, University of Southern California, Los Angeles, CA, 90089-0483, USA

SOURCE: Applied Physics Letters (2000), 76(24), 3525-3527

CODEN: APPLAB; ISSN: 0003-6951

PUBLISHER: American Institute of Physics

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Electro-optic polymer modulators operating at 1550 nm are demonstrated based on a nonlinear optical polymer of a phenyltetraene bridged chromophore in polycarbonate. It has a large electro-optic coefficient ( $r_{33}=55$  pm/V at 1550 nm), good thermal stability (90 °C), and low loss (1.7 dB/cm). A thin protective layer was used in the fabrication of ridge waveguides on the nonlinear polymer. We measured  $V_{\pi}$  of 2.4 and 3.7 V at 1300 and 1550 nm, resp. The chip loss of the modulator at both wavelengths was 5 dB, not including fiber coupling losses.

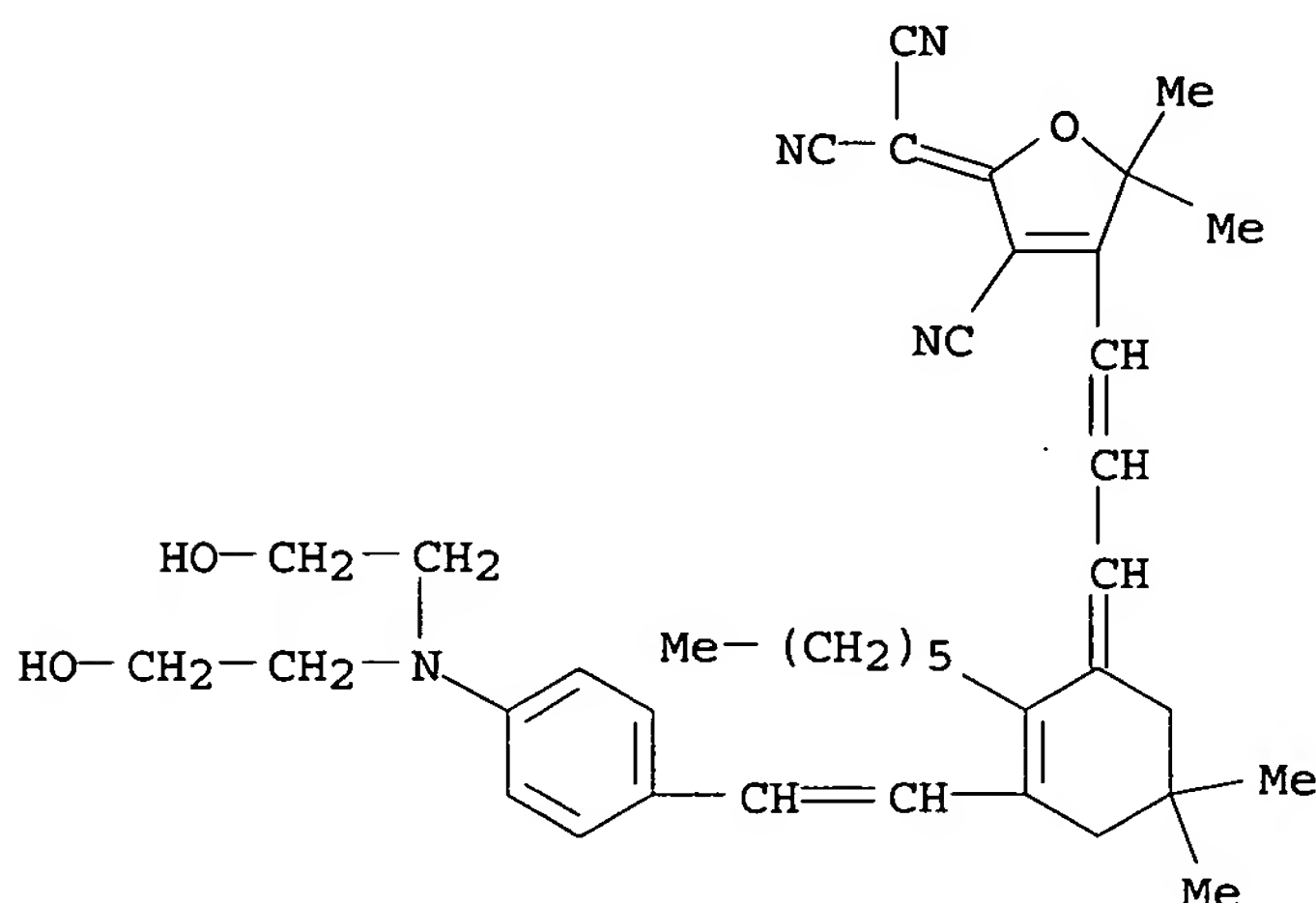
IT 259653-88-8

RL: MOA (Modifier or additive use); USES (Uses)

(chromophore; electro-optic polymer modulators for 1.55  $\mu$ m wavelength using phenyltetraene bridged chromophore in polycarbonate)

RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 11 THERE ARE 11 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 99 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:336442 HCAPLUS

DOCUMENT NUMBER: 133:24424

TITLE: Optical intensity modulator based on a novel electrooptic polymer incorporating a high  $\mu\beta$  chromophore

AUTHOR(S): Lee, Sang-Shin; Garner, Sean M.; Chuyanov, Vadim; Zhang, Hua; Steier, William H.; Wang, Fang; Dalton, Larry R.; Udupa, Anand H.; Fetterman, Harold R.

CORPORATE SOURCE: Department of Electrical Engineering-Electrophysics, University of Southern California, Los Angeles, CA, 90089-0483, USA

SOURCE: IEEE Journal of Quantum Electronics (2000), 36(5), 527-532

CODEN: IEJQA7; ISSN: 0018-9197

PUBLISHER: Institute of Electrical and Electronics Engineers

DOCUMENT TYPE: Journal

LANGUAGE: English

AB The authors synthesized a novel electrooptic (EO) polymer based on a high  $\mu\beta$  chromophore incorporating tricyanobutadiene acceptors. A crosslinked polyurethane network was also adopted to enhance its thermal stability. To find the optimum poling condition for the polymer, the influence of the elec. poling profile on optical characteristics such as EO effect, thermal stability, and damage was studied. Then a high-speed intensity modulator using the EO polymer was designed and fabricated. The measured half-wave voltage  $V\pi$  was 4.5 V at the wavelength of 1.31  $\mu\text{m}$ . Accordingly, the achieved EO coefficient  $r_{33}$  was  $\leq 25$  pm/V, and the thermal stability of the poled polymer was  $\leq 95^\circ$ . Finally, the modulator was successfully operated up to 40 GHz.

IT 247088-15-9P

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
(optical intensity modulator based on novel electrooptic polymer incorporating high  $\mu\beta$  chromophore)

RN 247088-15-9 HCAPLUS

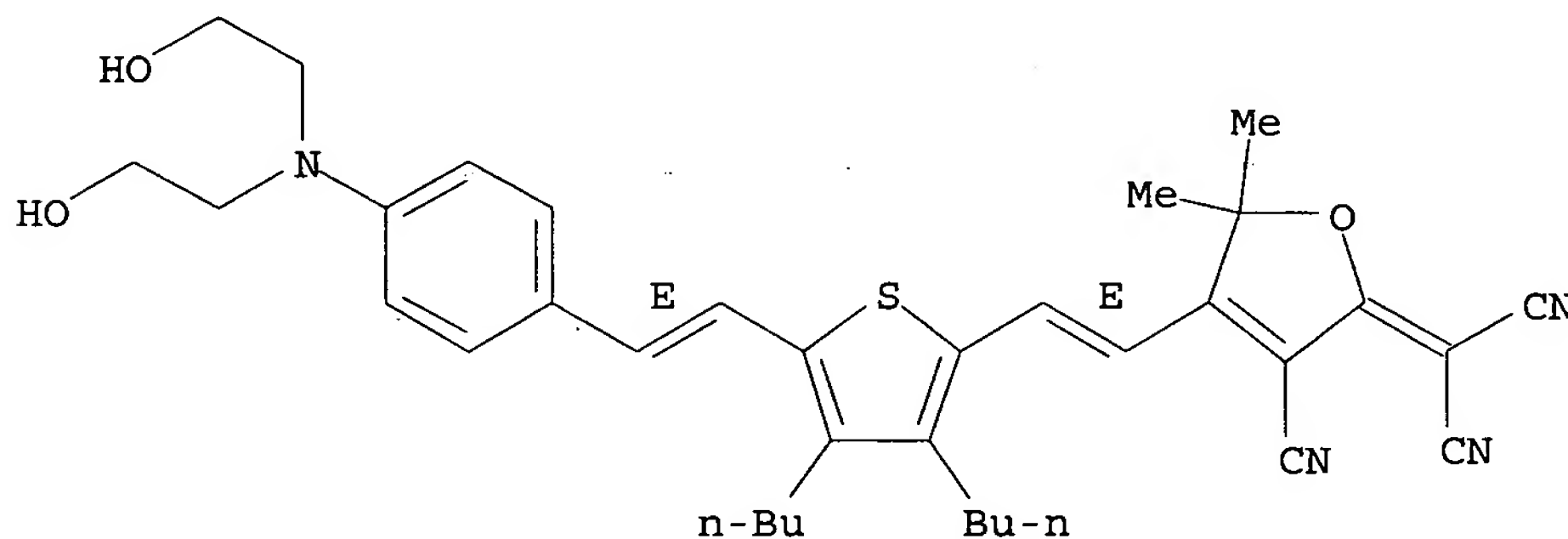
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-, polymer with 1,3-diisocyanatomethylbenzene (9CI) (CA INDEX NAME)

CM 1

CRN 247088-12-6

CMF C36 H42 N4 O3 S

Double bond geometry as shown.

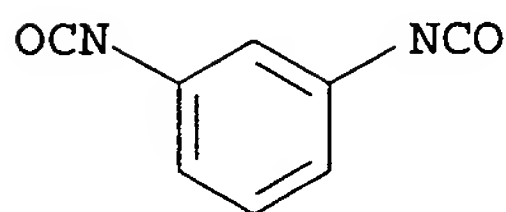


CM 2

CRN 26471-62-5

CMF C9 H6 N2 O2

CCI IDS



D1-Me



REFERENCE COUNT: 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS  
RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 100 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:248019 HCAPLUS

DOCUMENT NUMBER: 132:340819

TITLE: Monte Carlo statistical mechanical simulations of the  
competition of intermolecular electrostatic and  
poling-field interactions in defining macroscopic  
electro-optic activity for organic chromophore/polymer  
materials

AUTHOR(S): Robinson, B. H.; Dalton, L. R.

CORPORATE SOURCE: Department of Chemistry, University of Washington,  
Seattle, WA, 98195-1700, USA

SOURCE: Journal of Physical Chemistry A (2000), 104(20),  
4785-4795

CODEN: JPCAFH; ISSN: 1089-5639

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Monte Carlo statistical mech. computer simulations of the elec.-field  
poling of 2nd-order nonlinear optical chromophores, characterized by large  
dipole moments, polarizabilities, and hyperpolarizabilities, are  
presented. Such theor. anal. is critical to defining the structure/function  
relationships that permit maximization of electrooptical activity for  
 $\pi$ -electron chromophore-containing polymeric materials. Polymeric  
electrooptical materials may, in turn, be important for high-bandwidth  
telecommunications, new forms of radar, and high-speed data processing.  
The exptl. observed maxima in plots of electrooptical activity vs.  
chromophore number  $d$ . (loading) in polymer matrixes are theor. reproduced, as  
are the shifts of the maxima to lower loading with increasing chromophore  
dipole moment. Modification of the chromophore shape to realize the maximum  
achievable electrooptical activity for a given  $\pi$ -electron structure is  
discussed, as is the role of polymer elec. permittivity. Monte Carlo  
results are compared with the results of equilibrium statistical mech. calcns.  
based on the approximation of Piekara. The theor. results presented here have  
led to the production of polymeric electrooptical materials that permit  
devices with drive voltage requirements of  $<1$  V to be fabricated.  
Polymeric modulators now significantly exceed the performance capabilities  
(in terms of bandwidth and drive voltage) of electrooptical modulators  
based on inorg. materials.

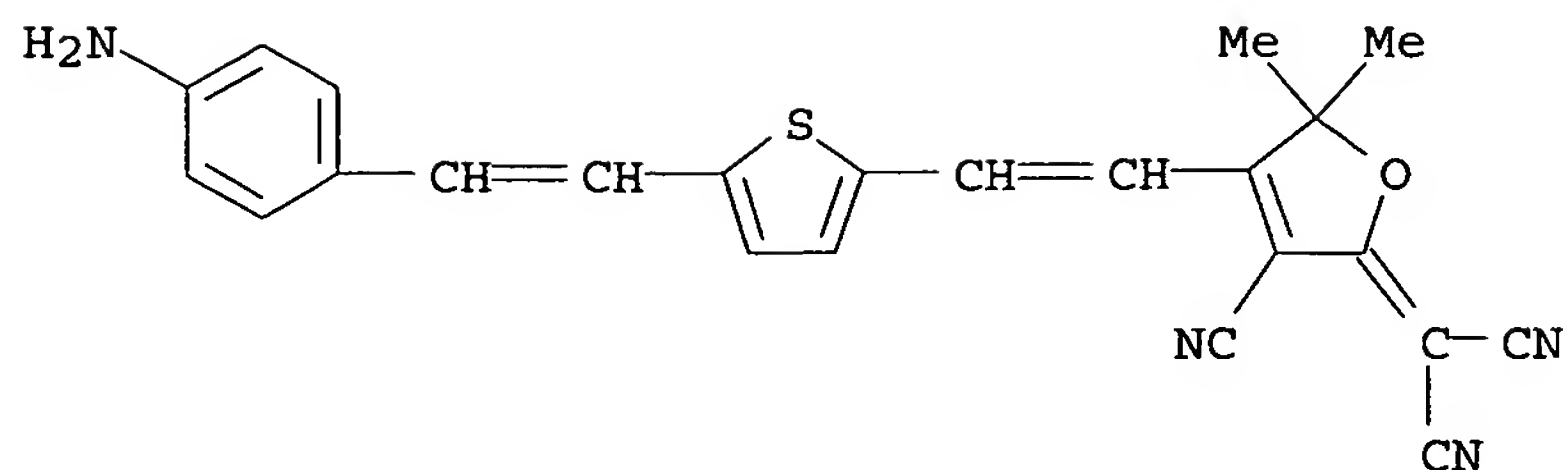
IT 267664-48-2D, amino and thienyl derivs. 267664-49-3D,  
amino derivs. 267664-50-6D, amino derivs.

RL: MOA (Modifier or additive use); PEP (Physical, engineering or chemical  
process); PRP (Properties); PROC (Process); USES (Uses)

(dopant; Monte Carlo statistical mech. simulations of the competition  
of intermol. electrostatic and poling-field interactions in defining  
macroscopic electrooptical activity for organic chromophore/polymer  
materials)

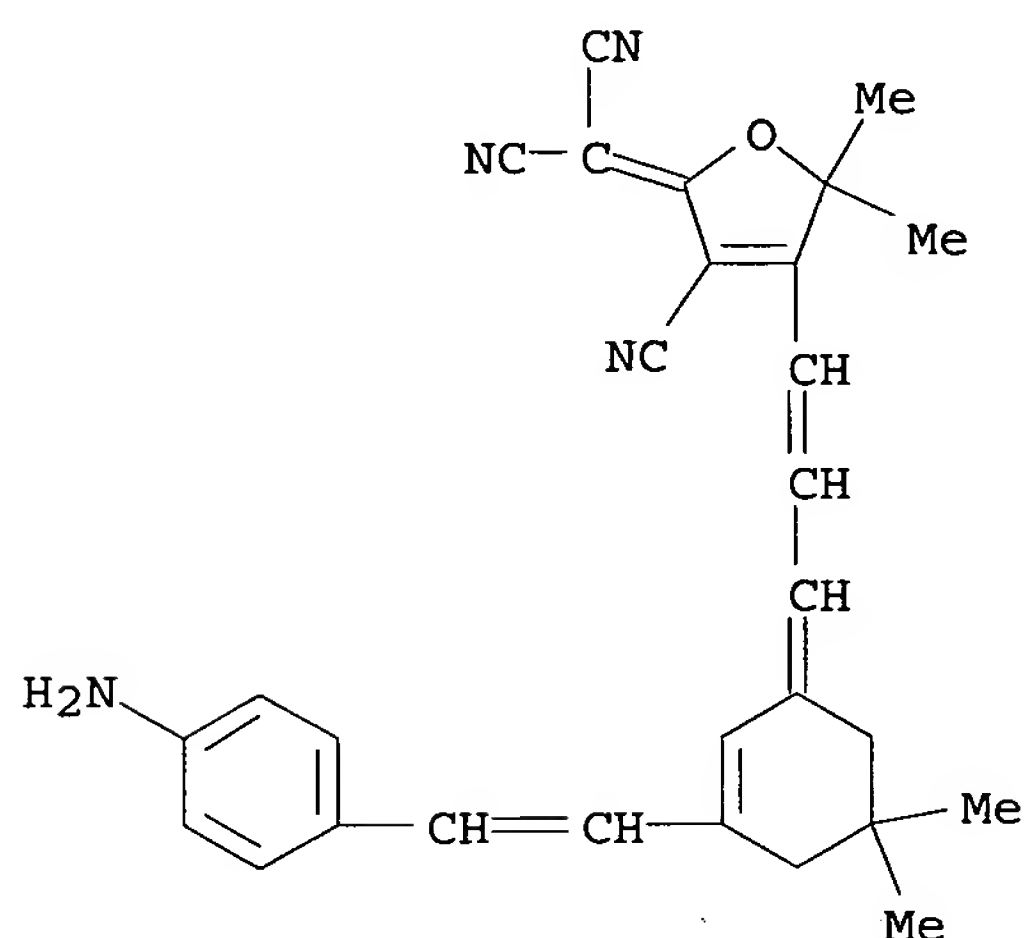
RN 267664-48-2 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-(4-aminophenyl)ethenyl]-2-thienyl]ethenyl]-3-  
cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



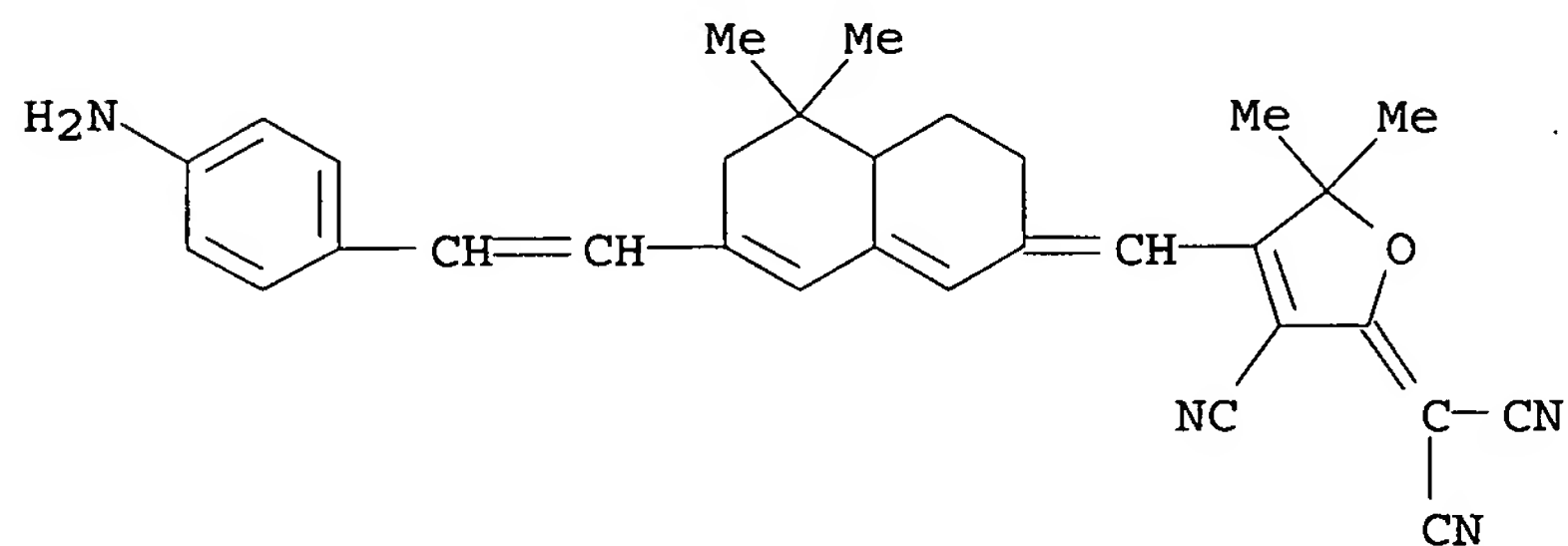
RN 267664-49-3 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-(4-aminophenyl)ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



RN 267664-50-6 HCAPLUS

CN Propanedinitrile, [4-[[7-[2-(4-aminophenyl)ethenyl]-4,4a,5,6-tetrahydro-5,5-dimethyl-2(3H)-naphthalenylidene]methyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT:

58

THERE ARE 58 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 101 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:245052 HCAPLUS

DOCUMENT NUMBER: 132:315554



TITLE: Low (sub-1-volt) halfwave voltage polymeric electro-optic modulators achieved by controlling chromophore shape

AUTHOR(S): Shi, Yongqiang; Zhang, Cheng; Zhang, Hua; Bechtel, James H.; Dalton, Larry R.; Robinson, Bruce H.; Steier, William H.

CORPORATE SOURCE: TACAN Corporation, Carlsbad, CA, 92008, USA

SOURCE: Science (Washington, D. C.) (2000), 288(5463), 119-122  
CODEN: SCIEAS; ISSN: 0036-8075

PUBLISHER: American Association for the Advancement of Science

DOCUMENT TYPE: Journal

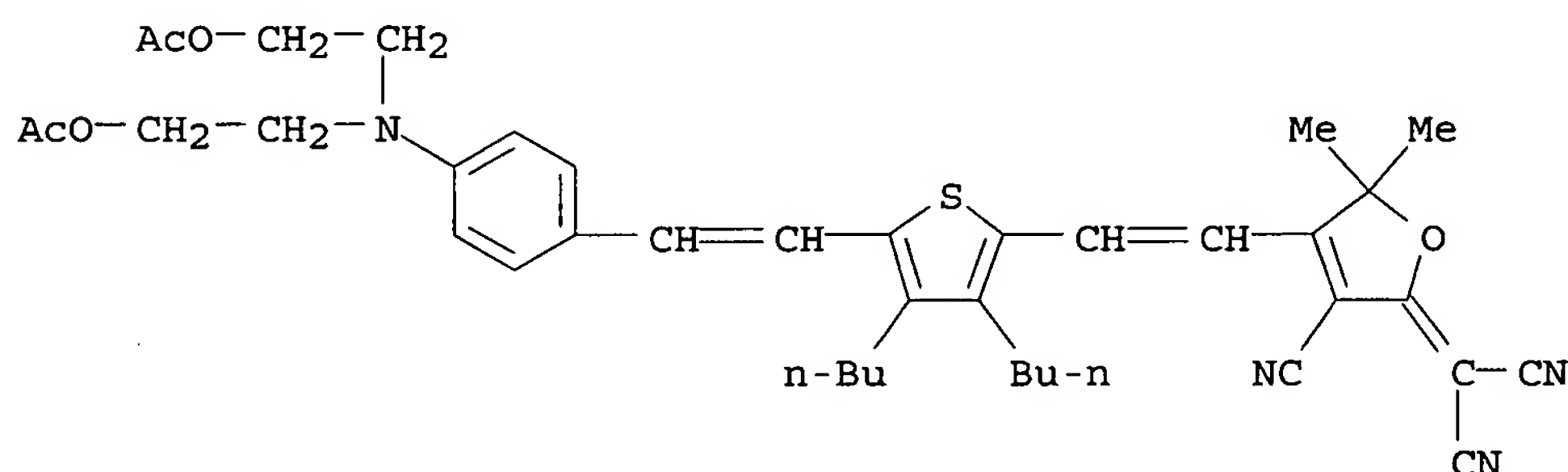
LANGUAGE: English

AB Electrooptic (EO) modulators encode elec. signals onto fiber optic transmissions. High drive voltages limit gain and noise levels. Typical polymeric and Li niobate modulators operate with halfwave voltages of 5 V. Sterically modified organic chromophores were used to reduce the attenuation of elec. field poling-induced electrooptic activity caused by strong intermol. electrostatic interactions. Such modified chromophores, incorporated into polymer hosts, were used to fabricate EO modulators with halfwave voltages of 0.8 V (at a telecommunications wavelength of 1318 nm) and to achieve a halfwave voltage-interaction length product of 2.2 V-centimeters. Optical push-pull poling and driving were also used to reduce halfwave voltage. This study, together with recent demonstrations of exceptional bandwidths (more than 110 GHz) and ease of integration (with very large scale integration semiconductor circuitry and ultra-low-loss passive optical circuitry) demonstrates the potential of polymeric materials for next generation telecommunications, information processing, and radio frequency distribution.

IT 213131-98-7 265992-52-7 265992-53-8  
265992-54-9  
RL: PRP (Properties)  
(low (sub-1-V) halfwave voltage polymeric electro-optic modulators achieved by controlling chromophore shape)

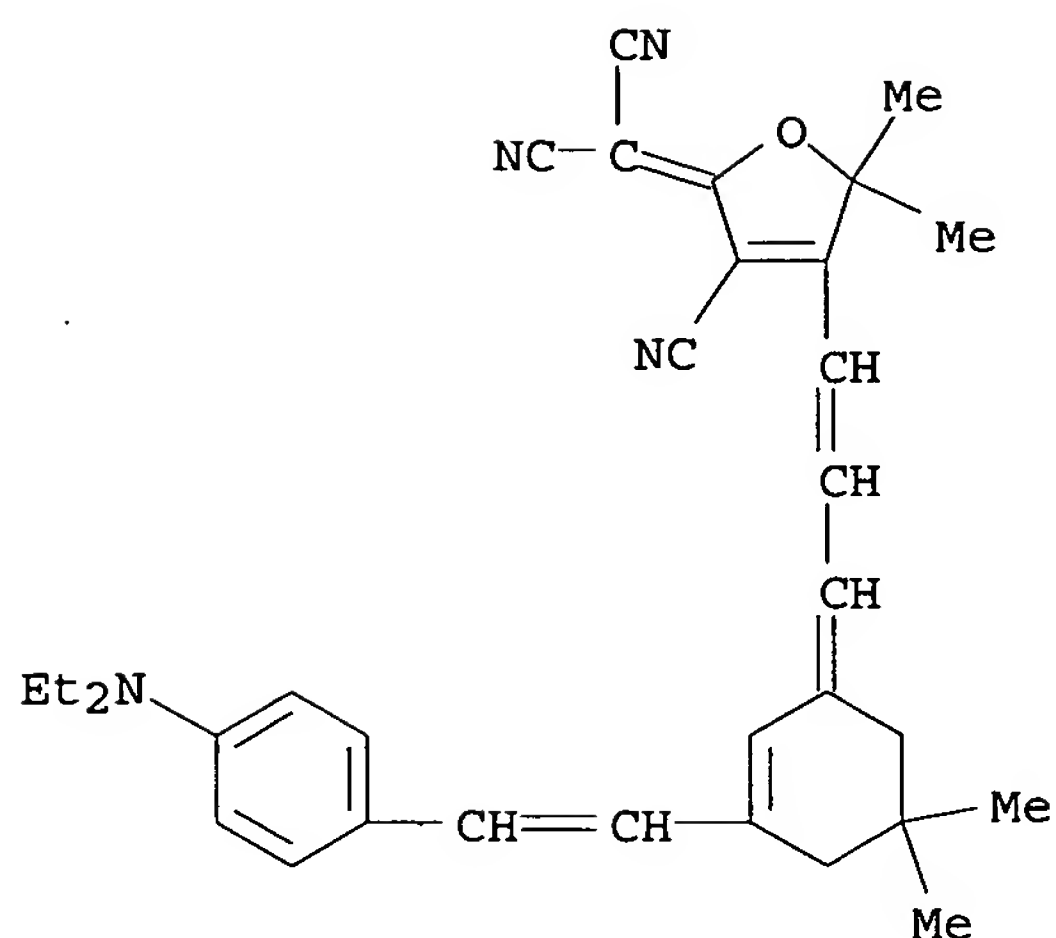
RN 213131-98-7 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



RN 265992-52-7 HCAPLUS

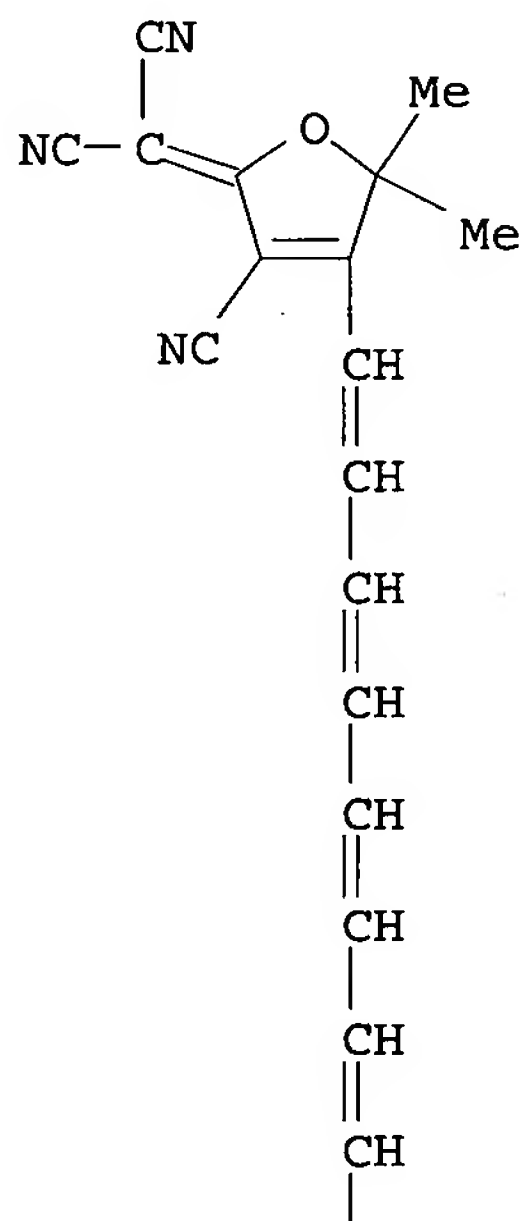
CN Propanedinitrile, [3-cyano-4-[3-[3-[2-[4-(diethylamino)phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)



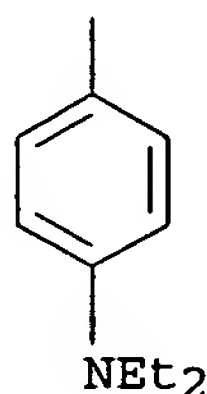
RN 265992-53-8 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[8-[4-(diethylamino)phenyl]-1,3,5,7-octatetraenyl]-5,5-dimethyl-2(5H)-furan-2-ylidene]-(9CI) (CA INDEX NAME)

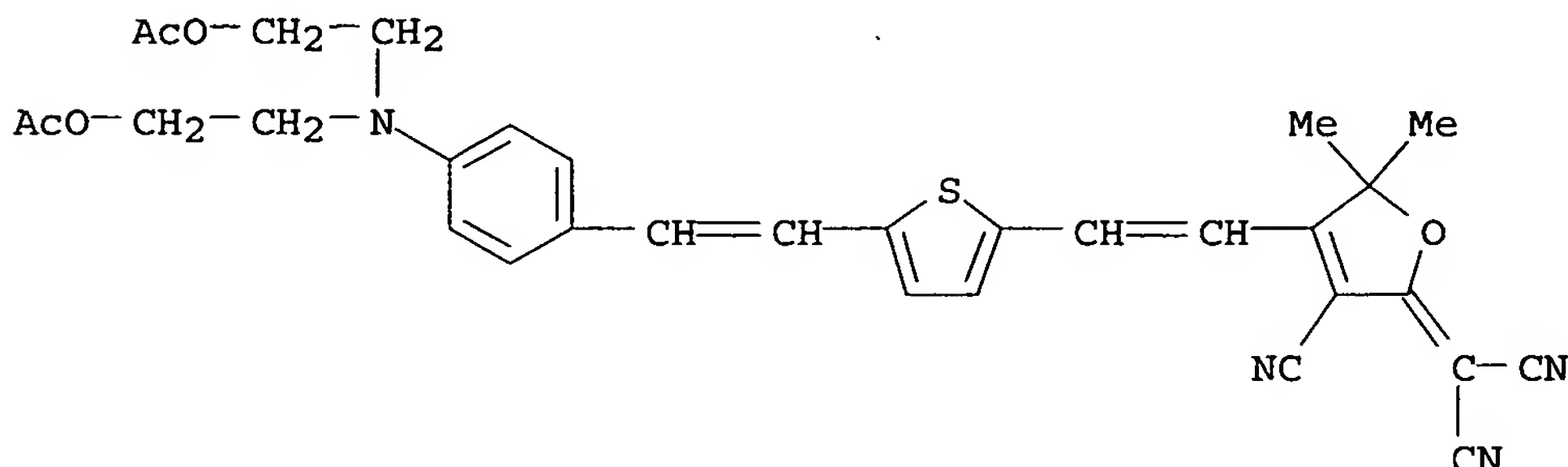
PAGE 1-A



PAGE 2-A

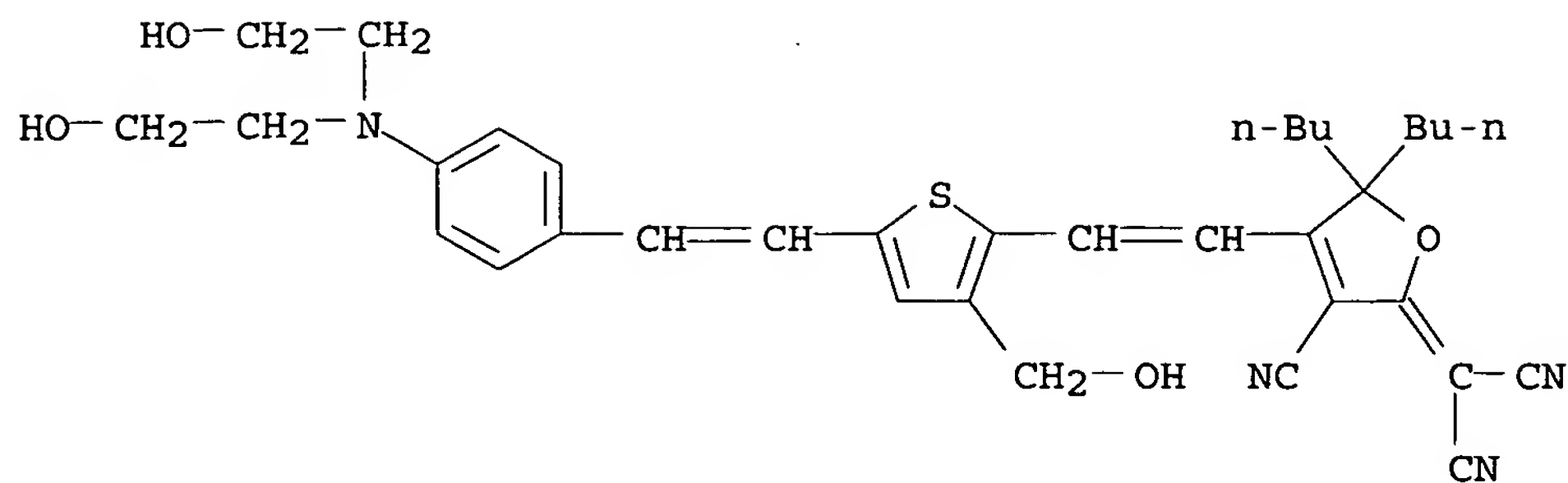


RN 265992-54-9 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene] - (9CI)  
 (CA INDEX NAME)



REFERENCE COUNT: 39 THERE ARE 39 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 102 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 2000:208420 HCAPLUS  
 DOCUMENT NUMBER: 132:335227  
 TITLE: Dendrimer functionalized NLO chromophores  
 AUTHOR(S): Londergan, Timothy M.; Zhang, Cheng; Ren, Albert; Dalton, Larry  
 CORPORATE SOURCE: Department of Chemistry, University of Washington, Seattle, WA, 98195, USA  
 SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (2000), 41(1), 783-784  
 CODEN: ACPPAY; ISSN: 0032-3934  
 PUBLISHER: American Chemical Society, Division of Polymer Chemistry  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB We have synthesized a Ph benzyl ether dendrimer containing an FTC chromophore in the core. This serves to isolate the nonlinear optical (NLO) active FTC mol. from neighboring chromophores, thereby decreasing the intermol. electrostatic interactions. The structure of the FTC-dendrimer was confirmed by <sup>1</sup>H NMR, <sup>13</sup>C NMR, and MALDI-TOF mass spectrometry.  
 IT 268548-55-6  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (in preparation of dendrimer-functionalized furanyl-thienyl-cyano-containing nonlinear optical chromophores)  
 RN 268548-55-6 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3-(hydroxymethyl)-2-thienyl]ethenyl]-5,5-dibutyl-3-cyano-2(5H)-furanlydene] - (9CI) (CA INDEX NAME)



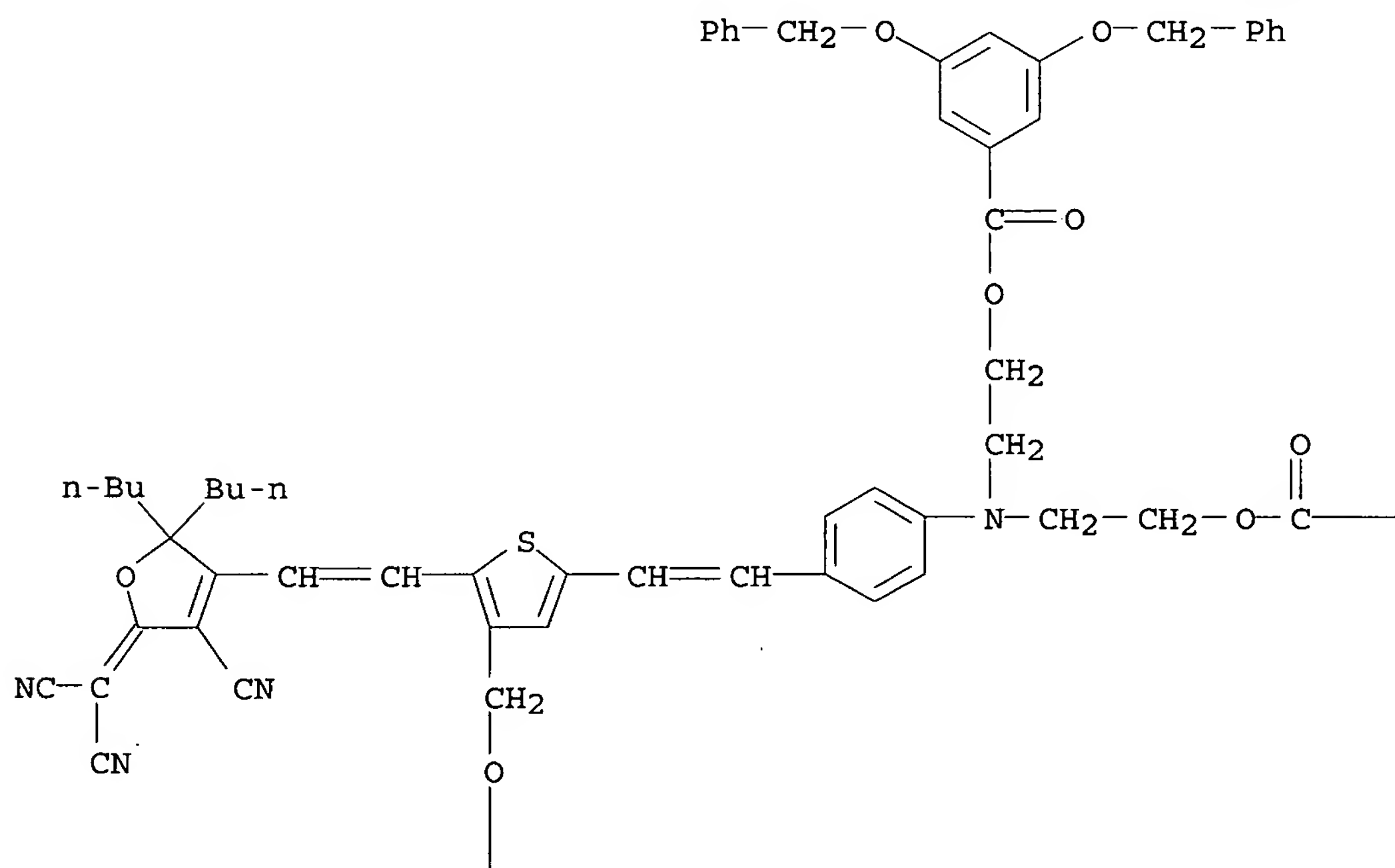
IT 268548-57-8P

RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation and characterization of)

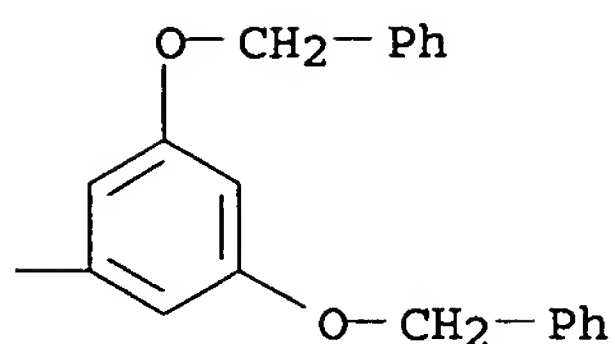
RN 268548-57-8 HCAPLUS

CN Benzoic acid, 3,5-bis(phenylmethoxy)-, [[4-[2-[4-[[[3,5-bis(phenylmethoxy)benzoyl]oxy]methyl]-5-[2-[2,2-dibutyl-4-cyano-5-(dicyanomethylene)-2,5-dihydro-3-furanyl]ethenyl]-2-thienyl]ethenyl]phenyl]imino]di-2,1-ethanediyl ester (9CI) (CA INDEX NAME)

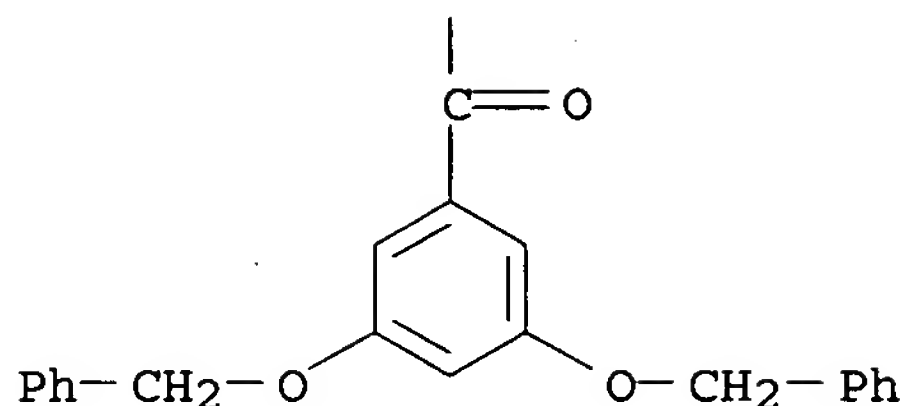
PAGE 1-A



PAGE 1-B



PAGE 2-A



REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 103 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
ACCESSION NUMBER: 2000:163800 HCAPLUS  
DOCUMENT NUMBER: 132:322374  
TITLE: Importance of intermolecular interactions in the nonlinear optical properties of poled polymers  
AUTHOR(S): Liakatas, I.; Cai, C.; Bosch, M.; Jager, M.; Bosshard, Ch.; Gunter, P.; Zhang, C.; Dalton, L. R.  
CORPORATE SOURCE: Swiss Federal Institute of Technology, ETH-Honggerberg, Zurich, CH-8093, Switz.  
SOURCE: Applied Physics Letters (2000), 76(11), 1368-1370  
CODEN: APPLAB; ISSN: 0003-6951  
PUBLISHER: American Institute of Physics  
DOCUMENT TYPE: Journal  
LANGUAGE: English

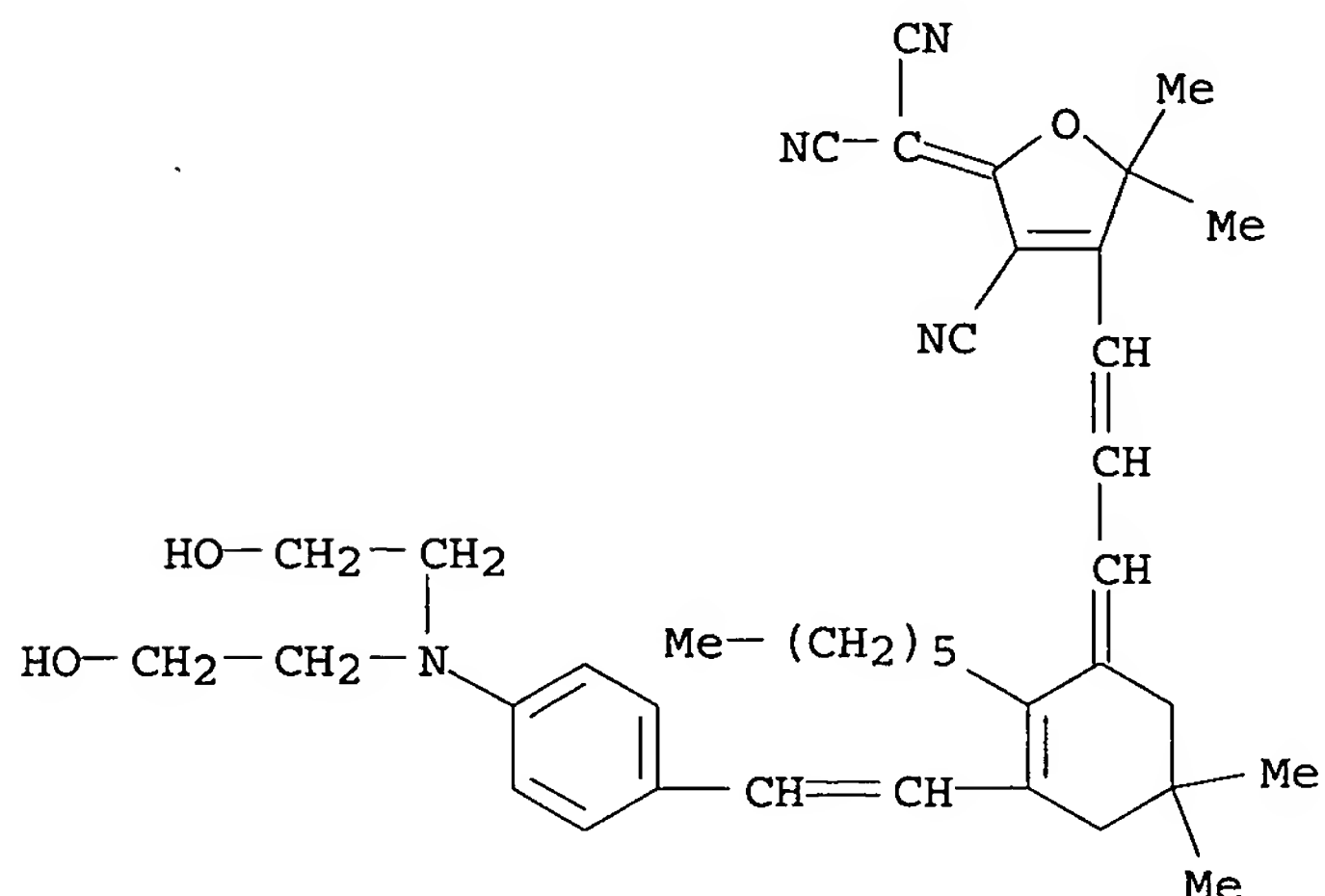
AB A series of phenylbithiophene stilbenes and phenyltetraenes were synthesized and their first-order mol. hyperpolarizabilities determined. Optical nonlinearities up to  $\mu\beta_0 = 9300 \pm 10^{-69} \text{ C m}^5/\text{V}$  were measured at 1907 nm. We show that intermol. interactions have a large influence on the optical nonlinearity of the mols. in solution and in guest-host polymers with poly(Me methacrylate) and polyquinoline as the host. We propose the use of a bulky donor group and a side chain perpendicular to the mol.'s conjugate bridge to reduce aggregation. Electro-optic coeffs. as high as  $r_{33} = 30 \text{ pm/V}$  at 1.55  $\mu\text{m}$  in poly(Me methacrylate) with 25 wt % chromophore loading were measured.

IT 259653-88-8 266348-40-7 266348-41-8

RL: MOA (Modifier or additive use); PRP (Properties); USES (Uses)  
(intermol. interactions in the nonlinear optical properties of poled polymers)

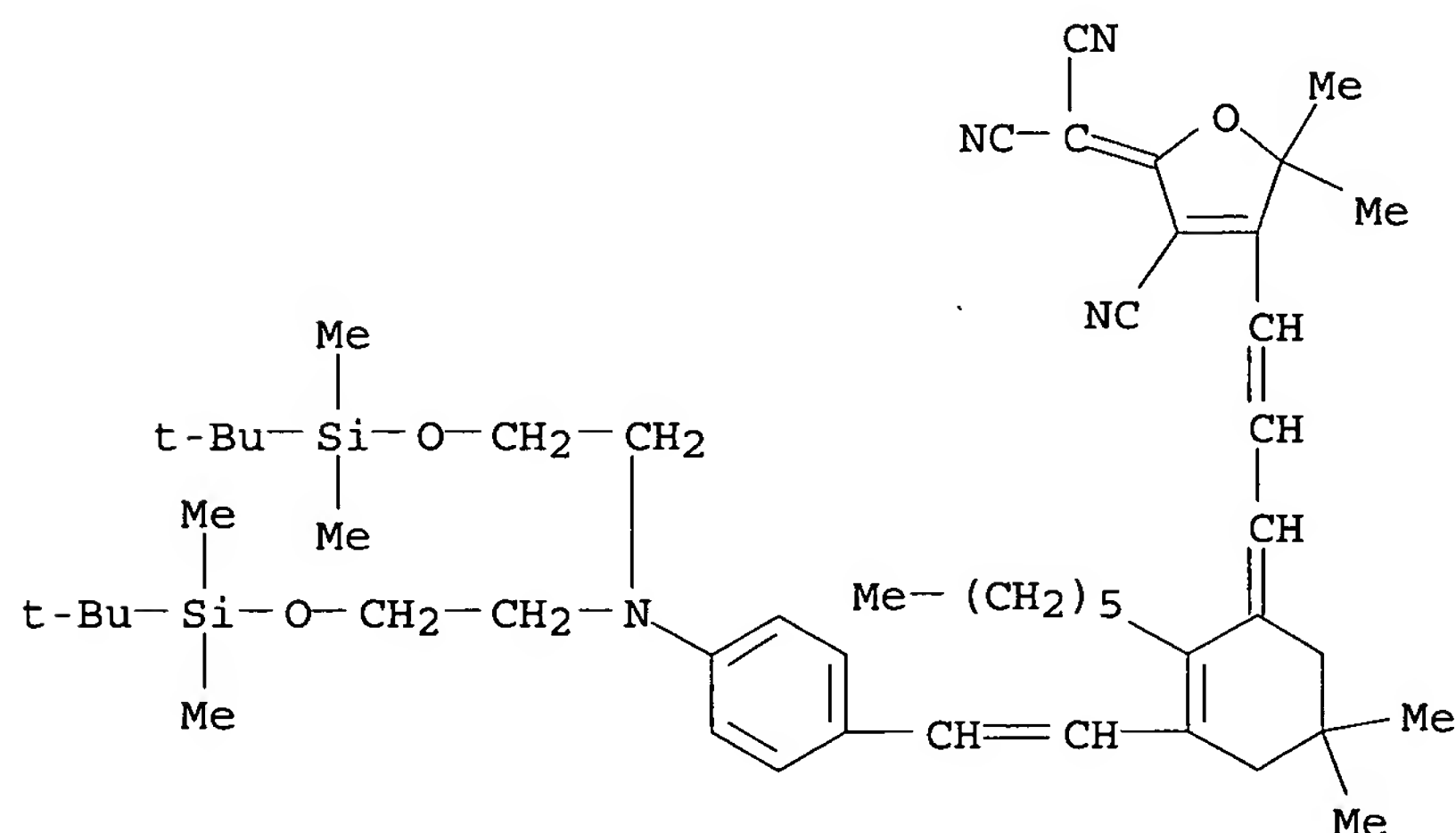
RN 259653-88-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



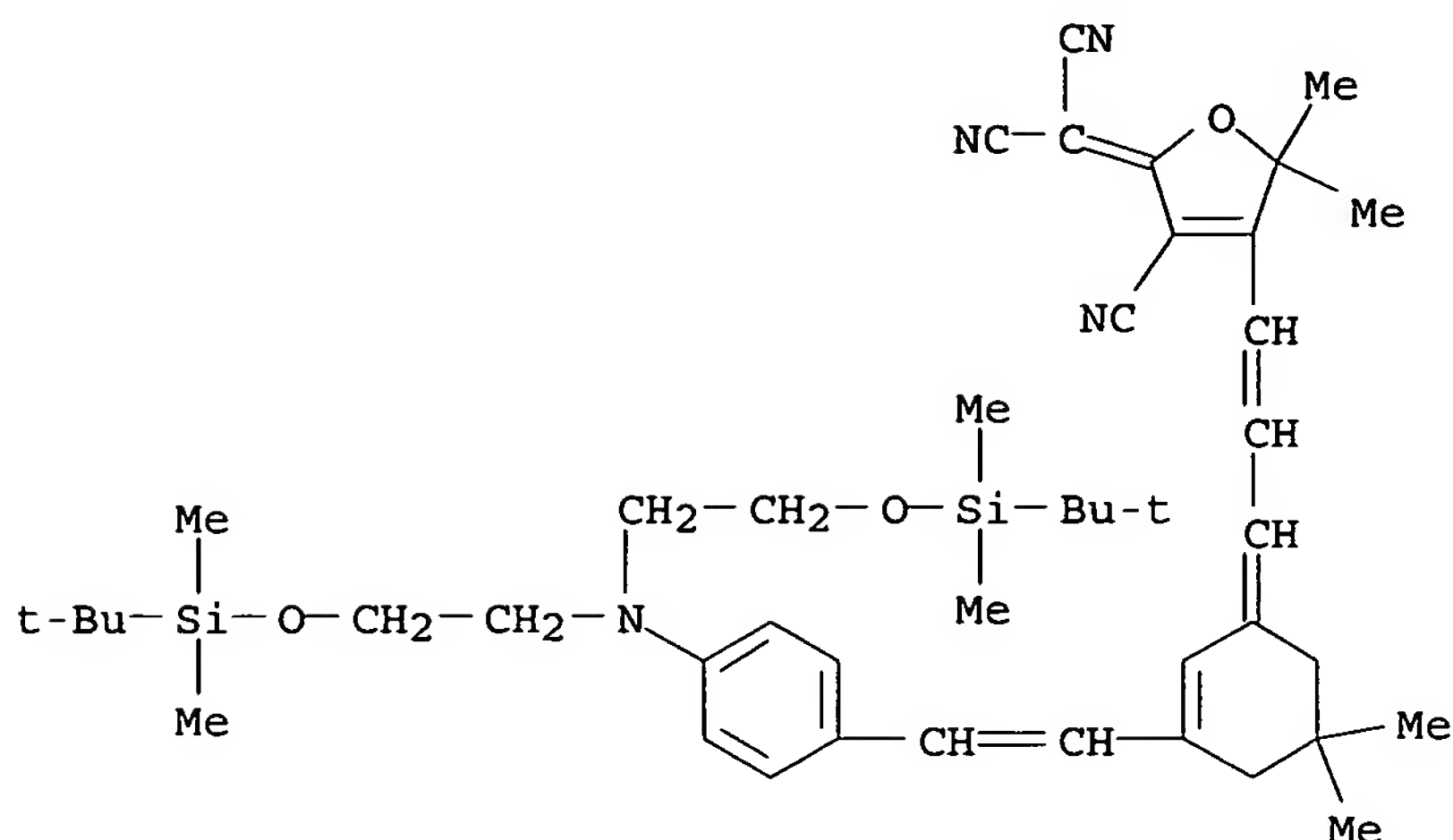
RN 266348-40-7 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 104 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:133769 HCAPLUS

DOCUMENT NUMBER: 132:167675

TITLE: New class of high hyperpolarizability organic chromophores and process for synthesizing the same  
INVENTOR(S): Dalton, Larry R.; Fetterman, Harold R.; Wang, Fang; Steier, William; Harper, Aaron W.; Ren, Albert S.; Michael, Joseph

PATENT ASSIGNEE(S): Pacific Wave Industries, Inc., USA

SOURCE: PCT Int. Appl., 45 pp.

CODEN: PIXXD2

DOCUMENT TYPE: Patent

LANGUAGE: English

FAMILY ACC. NUM. COUNT: 10

PATENT INFORMATION:

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
WO 2000009613	A2	20000224	WO 1999-US16274	19990726
WO 2000009613	A3	20000622		
W: AU, JP				
RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
US 6067186	A	20000523	US 1998-122806	19980727
AU 2000017034	A1	20000306	AU 2000-17034	19990726
PRIORITY APPLN. INFO.:			US 1998-122806	A 19980727
			WO 1999-US16274	W 19990726

OTHER SOURCE(S): MARPAT 132:167675

AB The chromophores incorporate at least one organic substituent and are formed in consideration of mol. shapes and a spatial anisotropy of intermol. interactions. The chromophores are processed into hardened material lattices to lock-in poling induced elec.-optic activity. Preferred organic substituents are alkyl, aryl, and isophorone groups. A composite including the organic chromophore, in a preferred embodiment, includes a polymer such as a poly(Me methacrylate), polyimide, polyamic acid,

polystyrene, polycarbonate or polyurethane. The optimized chromophores result in hardened electro-optic polymers suitable for electro-optic modulators and other devices such as optical switches. These modulators can be configured to work at high frequencies and in arrays for applications in communications and network connections. In addition, they can be implemented in series and parallel combinations in phased array radar, signal processing and sensor technol. applications.

IT 247088-14-8

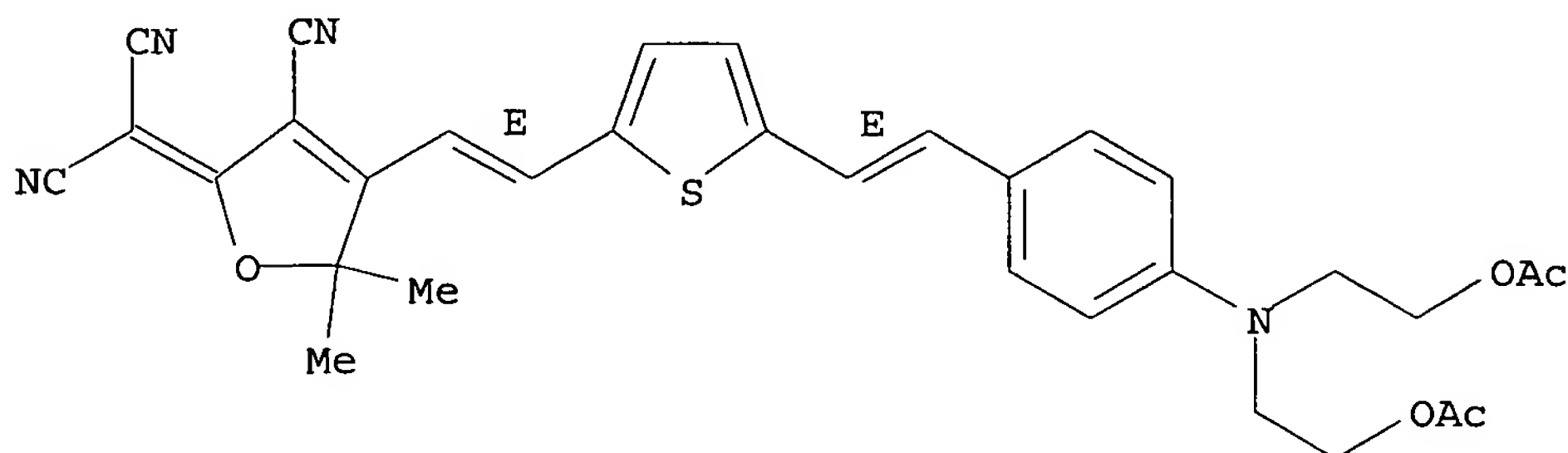
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)

(chromophores; new class of high hyperpolarizability organic chromophores and process for synthesizing same)

RN 247088-14-8 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 247088-13-7

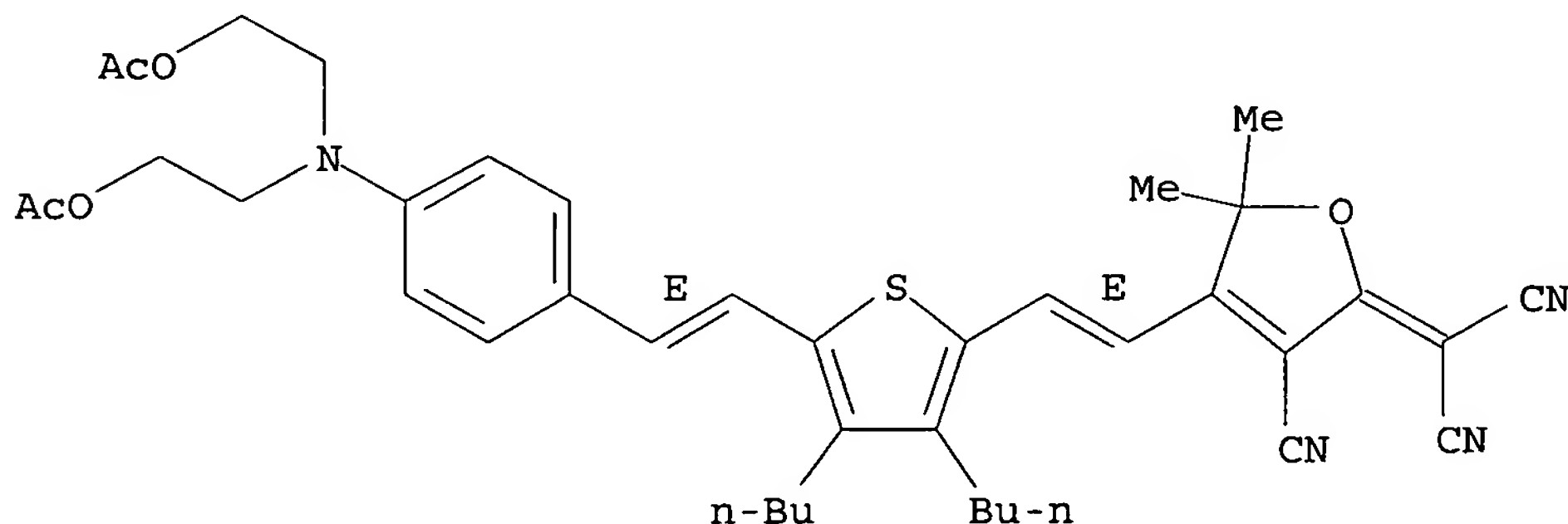
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)

(chromophores; reaction in manufacture of new class of high hyperpolarizability organic chromophores for use in electrooptical devices)

RN 247088-13-7 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 247088-12-6P

RL: IMF (Industrial manufacture); RCT (Reactant); PREP (Preparation); RACT



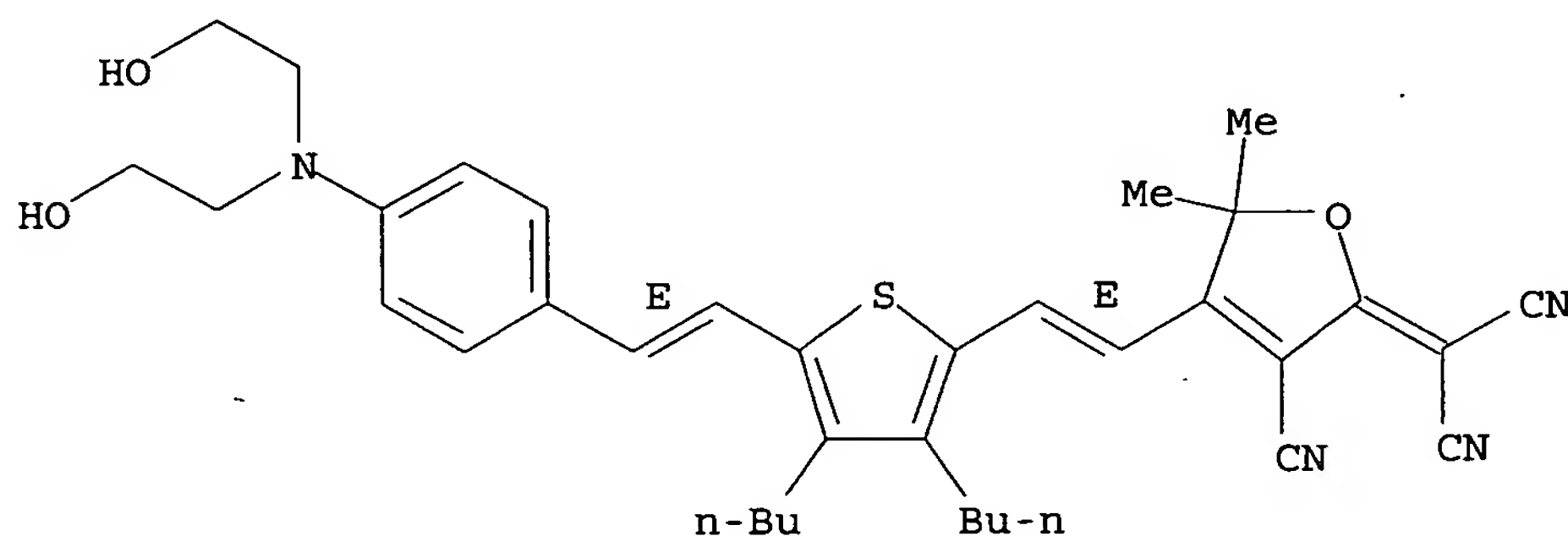
(Reactant or reagent)

(intermediate; reaction in manufacture of new class of high hyperpolarizability organic chromophores for use in electrooptical devices)

RN 247088-12-6 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



L8 ANSWER 105 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 2000:24450 HCAPLUS

DOCUMENT NUMBER: 132:158653

TITLE: DC biased electro-optic polymer waveguide modulators with low half-wave voltage and high thermal stability  
 AUTHOR(S): Chen, Antao; Chuyanov, Vadim; Zhang, Hua; Garner, Sean; Lee, Sang-Shin; Steier, William H.; Chen, Jinghong; Wang, Fang; Zhu, Jingsong; He, Mingqian; Ra, Younsoo; Mao, Shane S. H.; Harper, Aaron W.; Dalton, Larry R.; Fetterman, Harold R.

CORPORATE SOURCE: Department of Electrical, University of Southern California, Los Angeles, CA, 90089-0483, USA

SOURCE: Optical Engineering (Bellingham, Washington) (1999), 38(12), 2000-2008

CODEN: OPEGAR; ISSN: 0091-3286

PUBLISHER: SPIE-The International Society for Optical Engineering

DOCUMENT TYPE: Journal

LANGUAGE: English

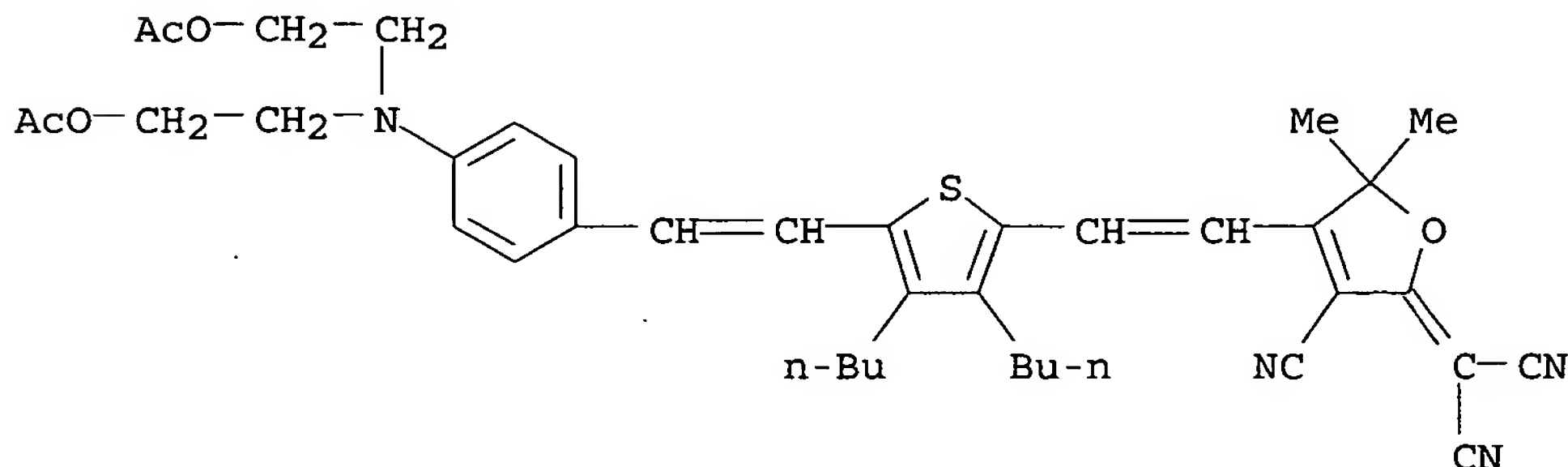
AB The full potential of 2nd-order nonlinear polymers can be used in electrooptic polymer modulators with a d.c. biased operation scheme to greatly reduce the half-wave voltage. This technique makes use of the total achievable electrooptic coefficient, which can be more than three times the value that was used by the conventional devices of poled electrooptic polymer. As the result of the d.c. bias and with high- $\mu\beta$  chromophores, a low half-wave voltage of 1.5 V was achieved with 2-cm-long birefringent waveguide modulators at the wavelength of 1.3  $\mu\text{m}$ . Results of a 200° stability experiment indicate that this scheme also enables electrooptic polymer devices to meet the short-term high-temperature stability requirement because the polymer does not need to be poled prior to high-temperature steps.

IT 213131-98-7

RL: PRP (Properties)

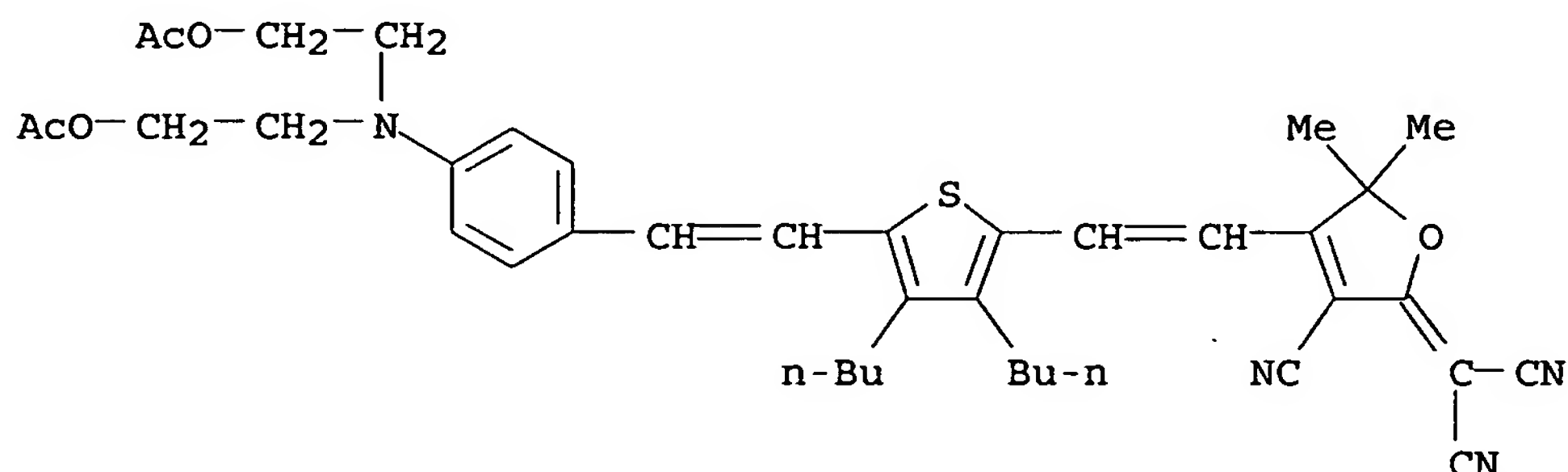
(DC biased electro-optic polymer waveguide modulators with low half-wave voltage and high thermal stability)

RN 213131-98-7 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

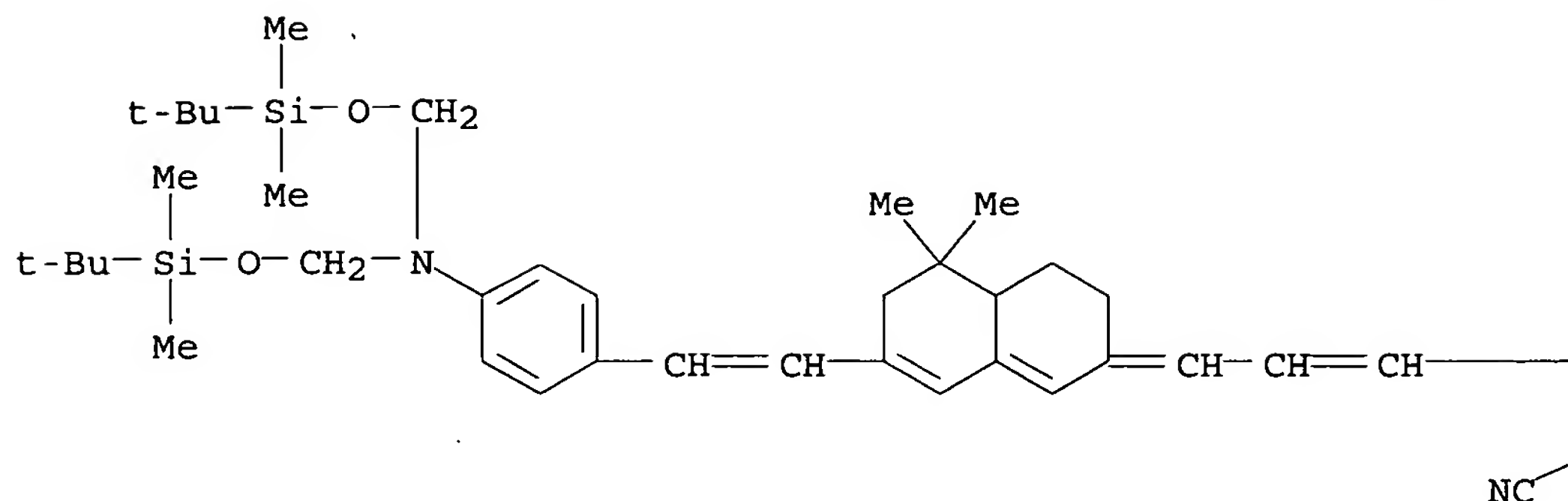
L8 ANSWER 106 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 1999:624487 HCAPLUS  
 DOCUMENT NUMBER: 131:350892  
 TITLE: Theoretical investigation on the first hyperpolarizability of push-pull polyenes containing non-aromatic cyclic olefins  
 AUTHOR(S): Zhu, P.; Wang, P.; Ye, C.  
 CORPORATE SOURCE: Institute of Chemistry, Organic Solids Laboratory, Center for Molecular Science, Chinese Academy of Sciences, Beijing, Peop. Rep. China  
 SOURCE: Chemical Physics Letters (1999), 311(3,4), 306-314  
 CODEN: CHPLBC; ISSN: 0009-2614  
 PUBLISHER: Elsevier Science B.V.  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB Novel push-pull polyenes containing non-aromatic cyclic olefins, such as cyclopentadiene, cyclopropene and cycloheptatriene, have been investigated for application of nonlinear optical (NLO) materials. Their dot products  $\mu\beta_0$  of first hyperpolarizability ( $\beta_0$ ) and dipole moment ( $\mu$ ) are calculated by employing AM1/Finite Field and ZINDO/S approaches. Among them, the largest value is as high as  $4.1 \times 10^{-45}$  esu. The origin of such high  $\mu\beta_0$  was analyzed based on the two-level model. Non-aromatic groups can transform to a stable aromatic anion/cation through gaining/losing an electron in their charge transfer states.  
 IT 213131-98-7  
 RL: PRP (Properties)  
 (theor. investigation on the first hyperpolarizability of push-pull polyenes containing non-aromatic cyclic olefins that become aromatic in the charge-transfer state)  
 RN 213131-98-7 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



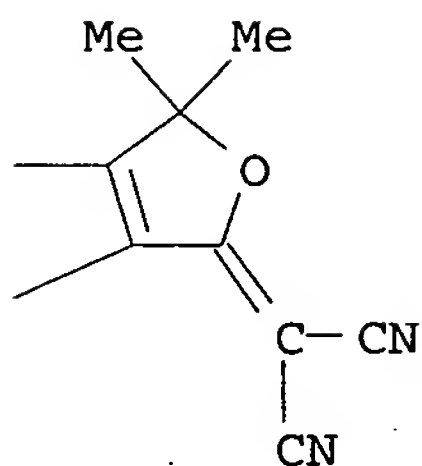
REFERENCE COUNT: 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 107 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 1999:559132 HCAPLUS  
 DOCUMENT NUMBER: 132:195032  
 TITLE: Design, synthesis and characterization of high- $\beta$  NLO chromophores with fused-ring polyenes  
 AUTHOR(S): Todorova, Galina; Ren, Albert S.; Lee, Michael S.; Zhang, Cheng; Dalton, Larry R.; Zhang, Hua; Steier, William  
 CORPORATE SOURCE: Locker Hydrocarbon Institute and Department of Chemistry, University of Southern California, SC, USA  
 SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (1999), 40(2), 916-917  
 CODEN: ACPPAY; ISSN: 0032-3934  
 PUBLISHER: American Chemical Society, Division of Polymer Chemistry  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB A general procedure for the synthesis of phenyltetraene and phenylpentaene fused-ring NLO chromophores was described. A chromophore bearing the 2-dicyanomethylen-3-cyano-4,4,5-trimethyl-2,5-dihydrofuran acceptor was synthesized and characterized by TGA/DTA and UV/Vis spectroscopy. Electro-optic coeffs. of polymer composites of the chromophore in PMMA at different loading densities were measured using the ATR technique. R33 value as high as 78 pm/V was achieved at the operational wavelength of 1064 nm.  
 IT 259856-52-5P  
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation and characterization and electrooptic coefficient of PMMA composite containing)  
 RN 259856-52-5 HCAPLUS  
 CN Propanedinitrile, [4-[3-[7-[2-[4-[bis[[[(1,1-dimethylethyl)dimethylsilyl]oxy)methyl]amino]phenyl]ethenyl]-4,4a,5,6-tetrahydro-5,5-dimethyl-2(3H)-naphthalenyldene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

PAGE 1-A



PAGE 1-B



REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 108 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 1999:559130 HCAPLUS  
 DOCUMENT NUMBER: 132:181391  
 TITLE: Chromophore incorporated fluorinated aromatic polyester for electro-optic applications  
 AUTHOR(S): Zhang, Cheng; Wang, Chuanguang; Zhou, Chaoyin; Lee, Michael; Chen, Mingfei; Dalton, Larry R.; Zhang, Hua; Steier, William H.  
 CORPORATE SOURCE: Loker Hydrocarbon Institute and Department of Chemistry, University of Southern California, Los Angeles, CA, 90089-1062, USA  
 SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (1999), 40(2), 912-913  
 CODEN: ACPPAY; ISSN: 0032-3934  
 PUBLISHER: American Chemical Society, Division of Polymer Chemistry  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB The incorporation is reported of hydroxy-functionalized CLD chromophore into fluorinated aromatic polyester, with results on the elec. field poling behavior. A fluorinated aromatic polyester has been studied. The polymerization

condition was found mild enough to allow covalent incorporation of high  $\mu\beta$  chromophores. The material has excellent solubility even in nonpolar solvent dioxane, yet, shows high thermal stability of elec. field poled chromophore dipole alignment. The poling behavior and optical loss study of the new material are currently under way.

IT 259653-89-9

RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)

(chromophore incorporated fluorinated aromatic polyester for electro-optic applications)

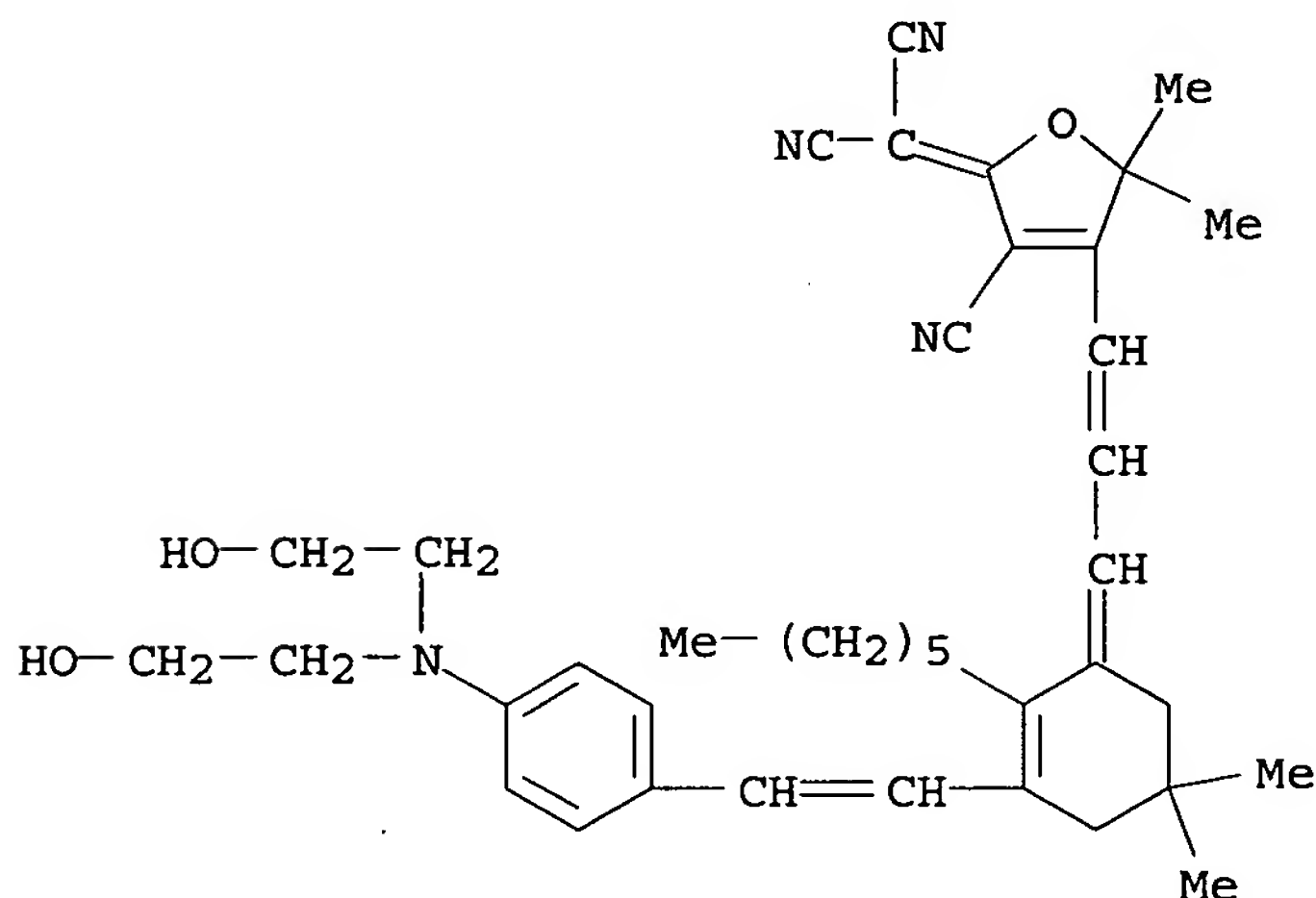
RN 259653-89-9 HCAPLUS

CN 1,3-Benzenedicarbonyl dichloride, 2,4,5,6-tetrafluoro-, polymer with [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]propanedinitrile and 4,4'-[2,2,2-trifluoro-1-(trifluoromethyl)ethylenidene]bis[phenol] (9CI) (CA INDEX NAME)

CM 1

CRN 259653-88-8

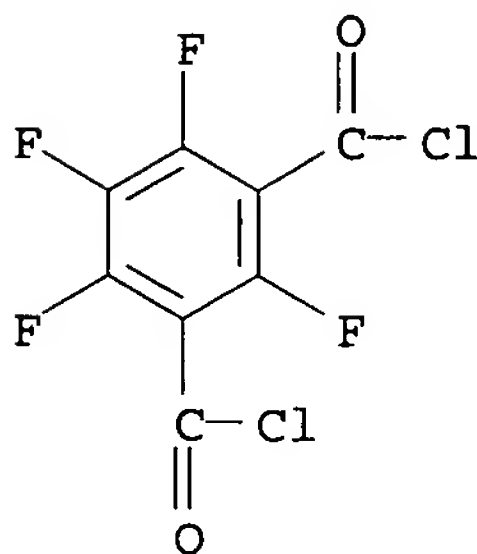
CMF C39 H48 N4 O3



CM 2

CRN 110649-97-3

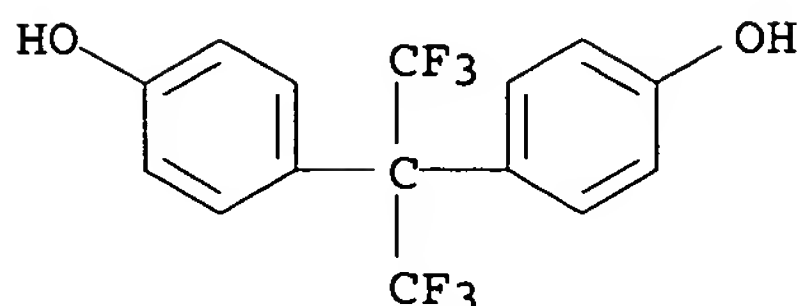
CMF C8 Cl2 F4 O2



CM 3

CRN 1478-61-1

CMF C15 H10 F6 O2



REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 109 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 1999:451775 HCAPLUS

DOCUMENT NUMBER: 131:300216

TITLE: Polymer electro-optic devices for integrated optics

AUTHOR(S): Steier, William H.; Chen, Antao; Lee, Sang-Shin; Garner, Sean; Zhang, Hua; Chuyanov, Vadim; Dalton, Larry R.; Wang, Fang; Ren, Albert S.; Zhang, Cheng; Todorova, Galina; Harper, Aaron; Fetterman, Harold R.; Chen, Datong; Udupa, Anand; Bhattacharya, Daipayan; Tsap, Boris

CORPORATE SOURCE: Department of Electrical Engineering, University of Southern California, Los Angeles, CA, 90089-0483, USA

SOURCE: Chemical Physics (1999), 245(1-3), 487-506

CODEN: CMPHC2; ISSN: 0301-0104

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal; General Review

LANGUAGE: English

AB A review, with 36 refs., of recent advances in electrooptic polymers and in fabrication techniques that have made possible advances in polymer optical waveguides which bring them much closer to system ready. The processing of a new thermosetting FTC polymer and its incorporation into a high-frequency, low- $V\pi$  optical amplitude modulator were reviewed. The design and fabrication of 100 GHz modulators and their integration with rectangular metal waveguides using an anti-podal finline transition with a flexible Mylar substrate was discussed. High-speed polymer modulators with balanced outputs and the in-situ trimming of the output coupler was described. More complex waveguides using polymers were demonstrated by the photonic rf phase shifter. Techniques for integrating both passive and active polymers into the same optical circuit without the need for mode matching was presented and demonstrated. To reduce the  $V\pi$  of a polymer amplitude modulator to 1 V or under, a technique of constant-bias voltage was demonstrated. Finally, a technique for direct maskless laser writing in fabrication of electrooptic polymer devices was reviewed.

IT 247088-15-9P

RL: DEV (Device component use); PRP (Properties); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(recent advances in electrooptic polymers in waveguides and other devices with integrated optics)

RN 247088-15-9 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-

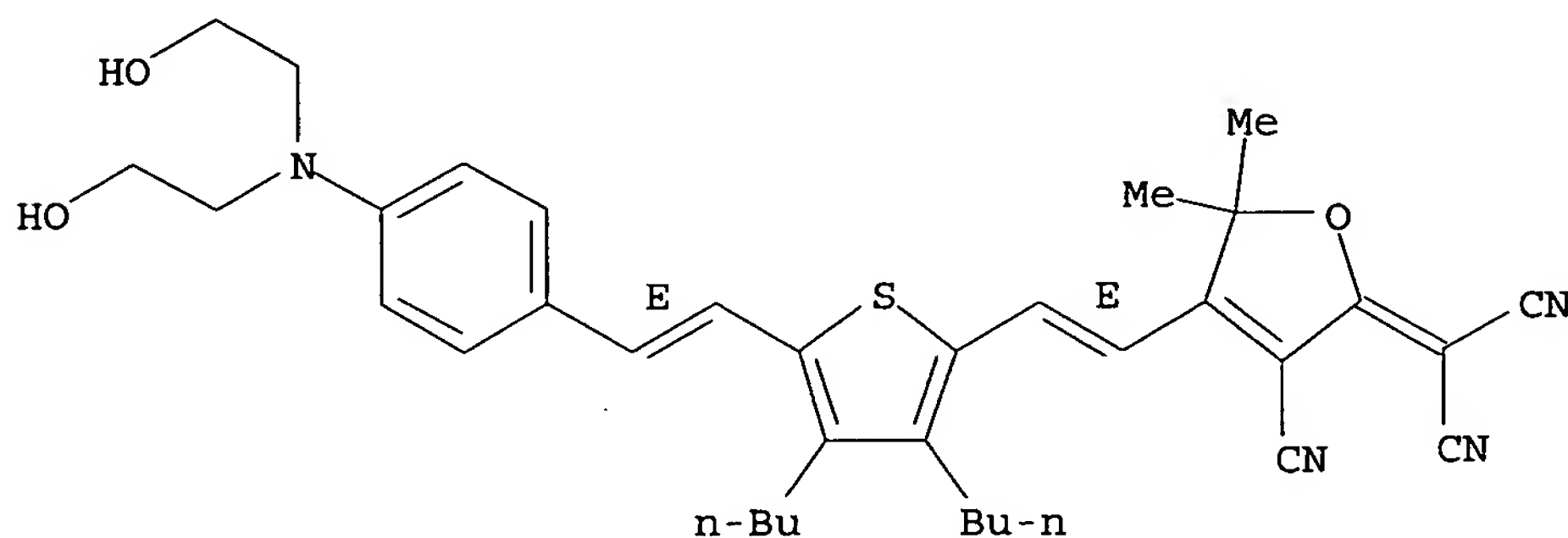
5,5-dimethyl-2(5H)-furanylidene]-, polymer with 1,3-diisocyanatomethylbenzene (9CI) (CA INDEX NAME)

CM 1

CRN 247088-12-6

CMF C36 H42 N4 O3 S

Double bond geometry as shown.

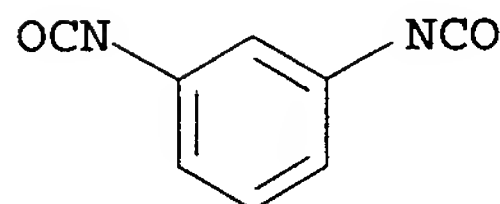


CM 2

CRN 26471-62-5

CMF C9 H6 N2 O2

CCI IDS



D1-Me

IT 224746-62-7, Propanedinitrile, [4-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-

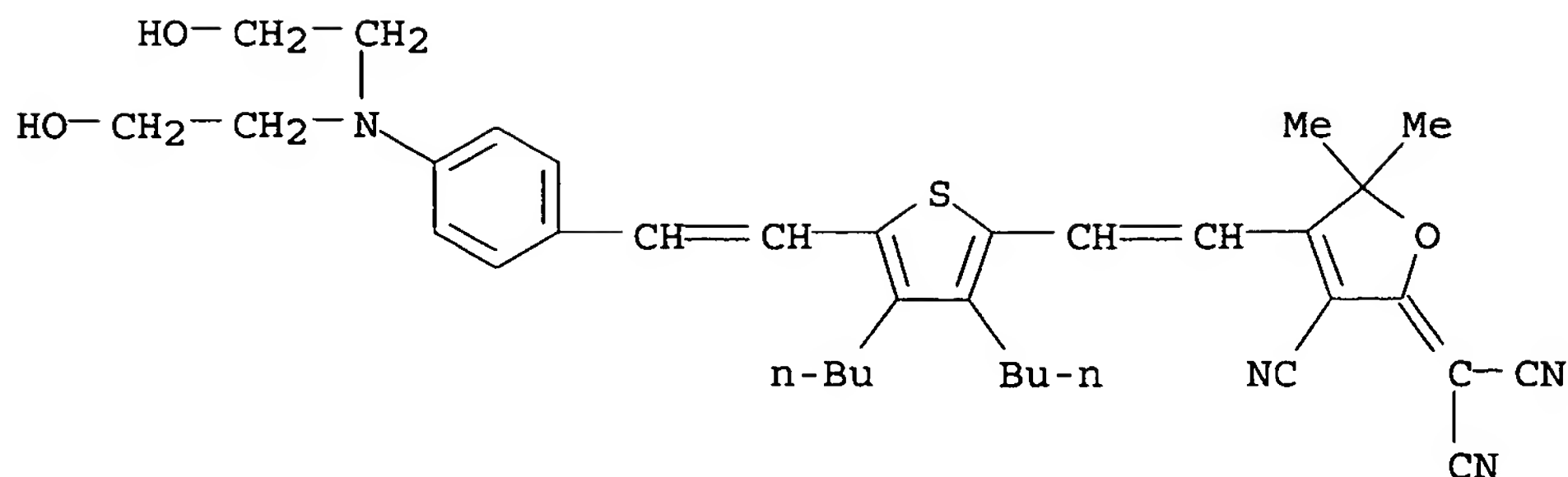
RL: RCT (Reactant); RACT (Reactant or reagent)

(recent advances in electrooptic polymers in waveguides and other devices with integrated optics)

RN 224746-62-7 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)





REFERENCE COUNT: 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 110 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 1999:451741 HCAPLUS

DOCUMENT NUMBER: 131:300096

TITLE: The molecular and supramolecular engineering of polymeric electro-optic materials

AUTHOR(S): Robinson, B. H.; Dalton, L. R.; Harper, A. W.; Ren, A.; Wang, F.; Zhang, C.; Todorova, G.; Lee, M.; Aniszfild, R.; Garner, S.; Chen, A.; Steier, W. H.; Houbrecht, S.; Persoons, A.; Ledoux, I.; Zyss, J.; Jen, A. K. Y.

CORPORATE SOURCE: Department of Chemistry, University of Washington, Seattle, WA, USA

SOURCE: Chemical Physics (1999), 245(1-3), 35-50

CODEN: CMPHC2; ISSN: 0301-0104

PUBLISHER: Elsevier Science B.V.

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A new class of electrooptic chromophores, of which 2-dicyanomethylen-3-cyano-4-{2-[E-(4-N,N-di(2-acetoxyethyl)-amino)-phenylene-(3,4-dibutyl)thien-5]-E-vinyl}-5,5-dimethyl-2,5-dihydrofuran (denoted FTC) is the prototype, was prepared, characterized, and used to fabricate electrooptic devices. The mol. hyperpolarizability and thermal stability of these chromophore mols. are exceptional. Strong intermol. electrostatic interactions inhibit the efficient poling of these mols. A statistical mech. theor. treatment is used to quant. predict the competition of poling, intermol. electrostatic interactions, and thermal effects in defining achievable acentric order and hence macroscopic optical nonlinearity. Theory is used to predict the optimum chromophore structure and material composition (chromophore loading in a polymer matrix) for maximum electrooptic activity and min. optical loss. Problems associated with lattice hardening to lock-in poling-induced order are discussed briefly.

IT 247088-15-9P

RL: DEV (Device component use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(preparation and characterization of electrooptic chromophores for fabrication of electrooptic devices)

RN 247088-15-9 HCAPLUS

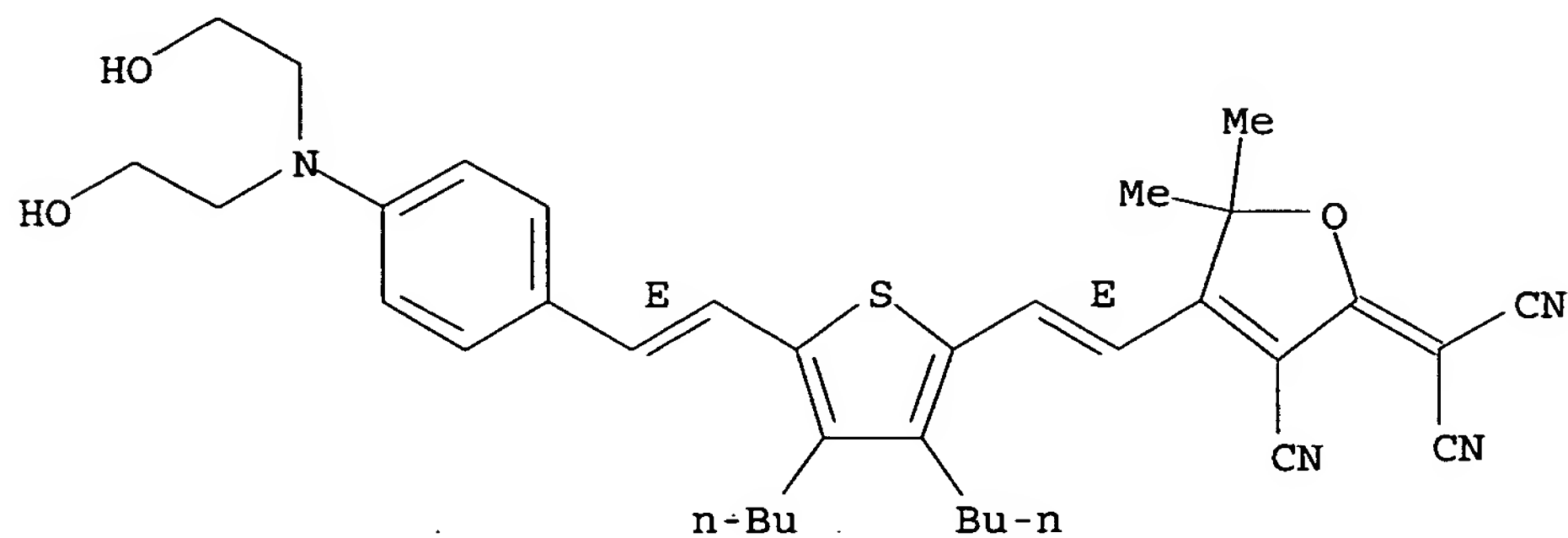
CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)aminolphenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene]-, polymer with 1,3-diisocyanatomethylbenzene (9CI) (CA INDEX NAME)

CM 1



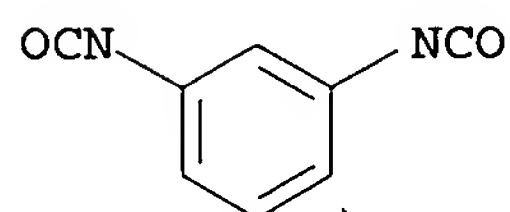
CRN 247088-12-6  
CMF C36 H42 N4 O3 S

Double bond geometry as shown.



CM 2

CRN 26471-62-5  
CMF C9 H6 N2 O2  
CCI IDS



D1-Me

IT 247088-14-8

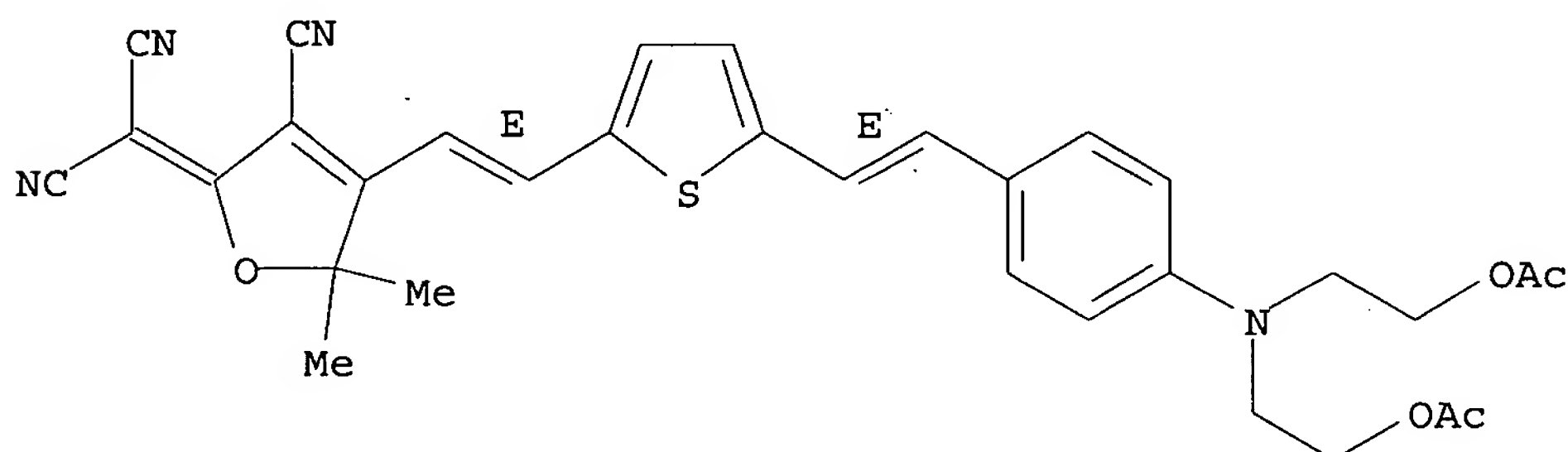
RL: PRP (Properties)

(preparation and characterization of electrooptic chromophores for  
fabrication of electrooptic devices)

RN 247088-14-8 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)

Double bond geometry as shown.



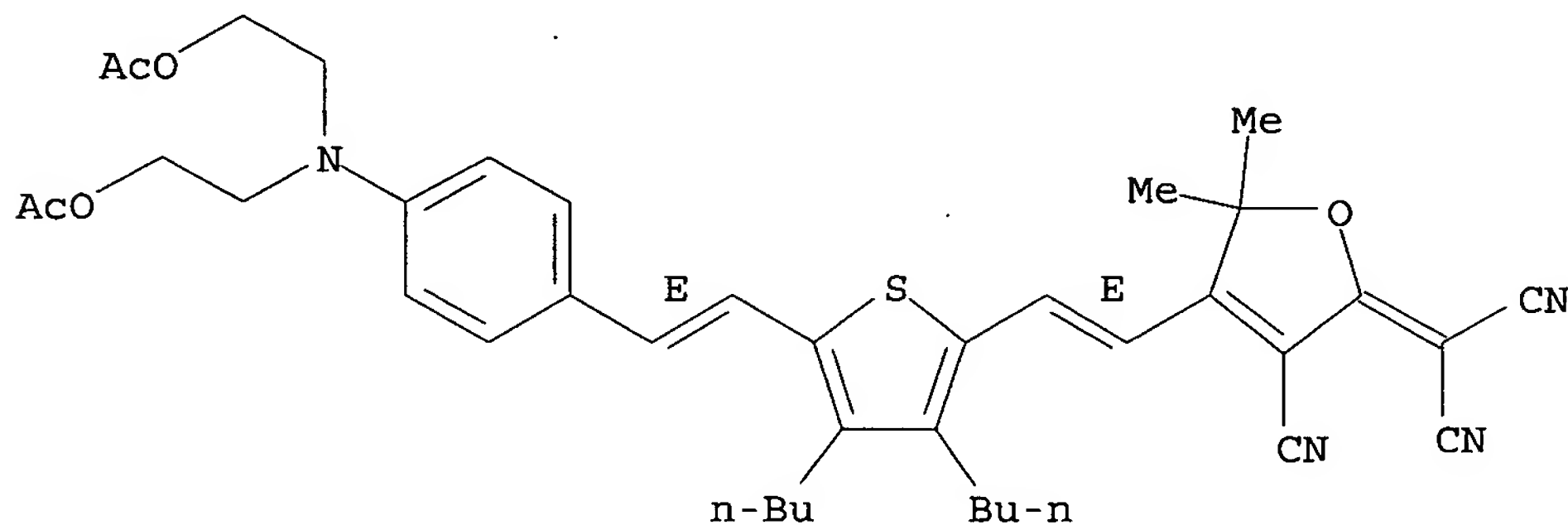
IT 247088-13-7P

RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(preparation and characterization of electrooptic chromophores for  
fabrication of electrooptic devices)

RN 247088-13-7 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

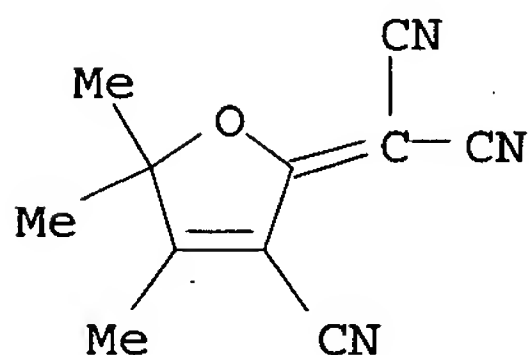


IT 171082-32-9P, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran 247088-12-6P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
(Reactant or reagent)  
(preparation and characterization of electrooptic chromophores for  
fabrication of electrooptic devices)

RN 171082-32-9 HCAPLUS

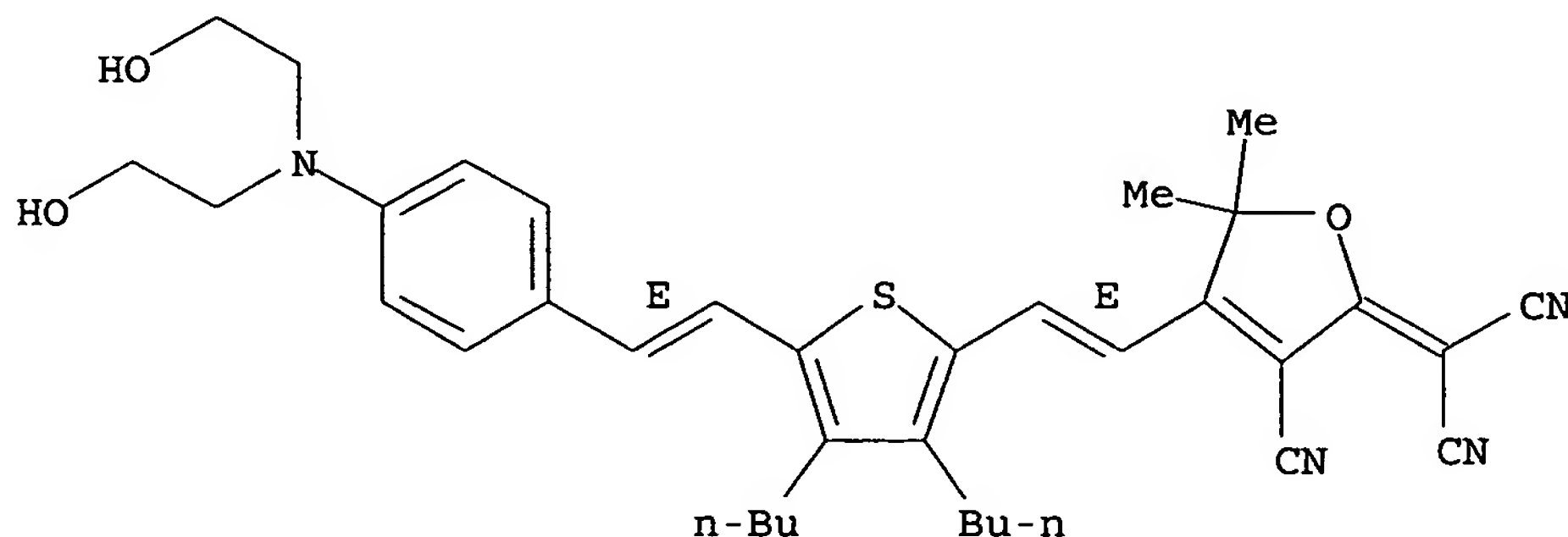
CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA INDEX NAME)



RN 247088-12-6 HCAPLUS

CN Propanedinitrile, [4-[(1E)-2-[5-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



REFERENCE COUNT: 41 THERE ARE 41 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

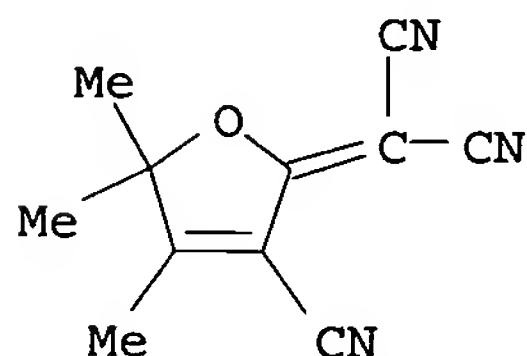
L8 ANSWER 111 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 1999:428247 HCAPLUS  
 DOCUMENT NUMBER: 131:214966  
 TITLE: Synthesis and Characterization of Sterically Stabilized Second-Order Nonlinear Optical Chromophores  
 AUTHOR(S): Zhang, Cheng; Ren, Albert S.; Wang, Fang; Zhu, Jingsong; Dalton, Larry R.; Woodford, J. N.; Wang, C. H.  
 CORPORATE SOURCE: Loker Hydrocarbon Research Institute, University of Southern California, Los Angeles, CA, 90089-1661, USA  
 SOURCE: Chemistry of Materials (1999), 11(8), 1966-1968  
 CODEN: CMATEX; ISSN: 0897-4756  
 PUBLISHER: American Chemical Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English

AB A general synthetic method for preparing ring-locked polyene donor-bridged chromophones was developed. The starting material N-phenyldiethanolamine was brominated as the two hydroxy groups were protected, followed by reaction with an enone and methylmagnesium iodide. The formed compound was deprotected and reprotected by acetyl group to give an aldehyde derivative, and then three representative chromophores were made by coupling with weak, medium strong and strong acceptors.

IT 171082-32-9  
 RL: RCT (Reactant); RACT (Reactant or reagent)  
 (synthesis and characterization of sterically stabilized second-order nonlinear optical chromophores)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furan-2-ylidene)- (9CI) (CA INDEX NAME)

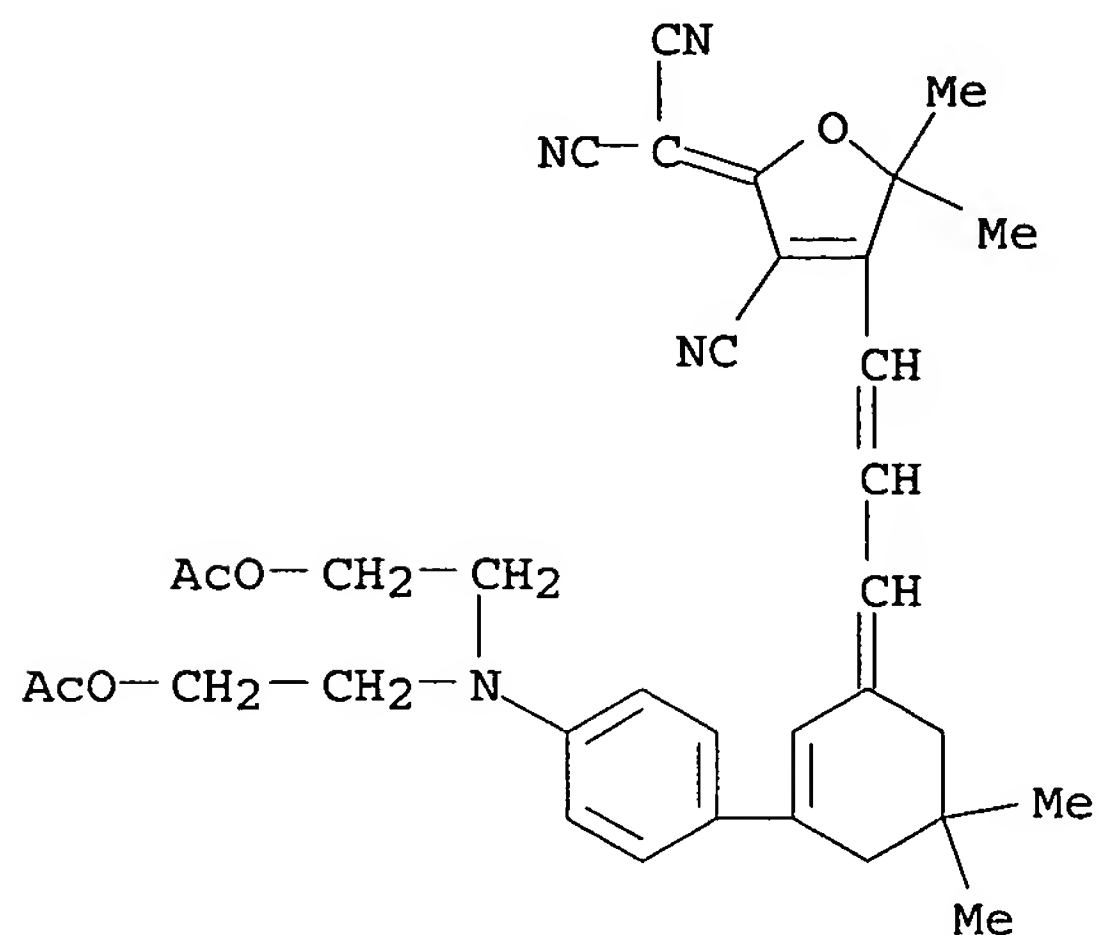


IT 243463-19-6P 243463-22-1P  
 RL: SPN (Synthetic preparation); PREP (Preparation)  
 (synthesis and characterization of sterically stabilized second-order

nonlinear optical chromophores)

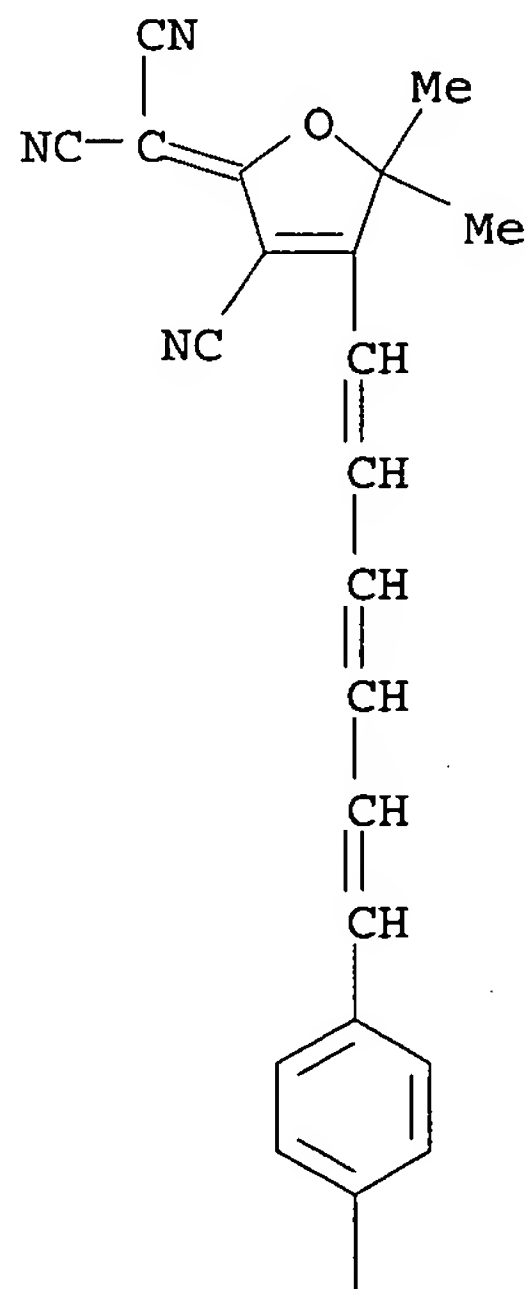
RN 243463-19-6 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



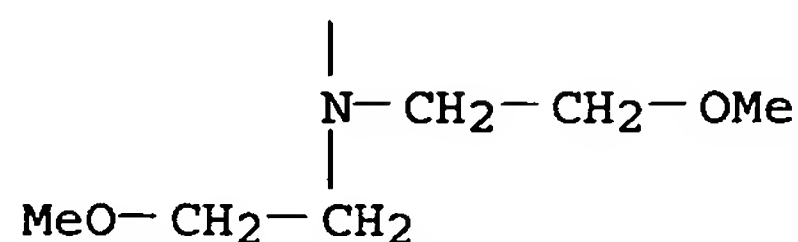
RN 243463-22-1 HCAPLUS

CN Propanedinitrile, [4-[6-[4-[bis(2-methoxyethyl)amino]phenyl]-1,3,5-hexatrienyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene] - (9CI) (CA INDEX NAME)



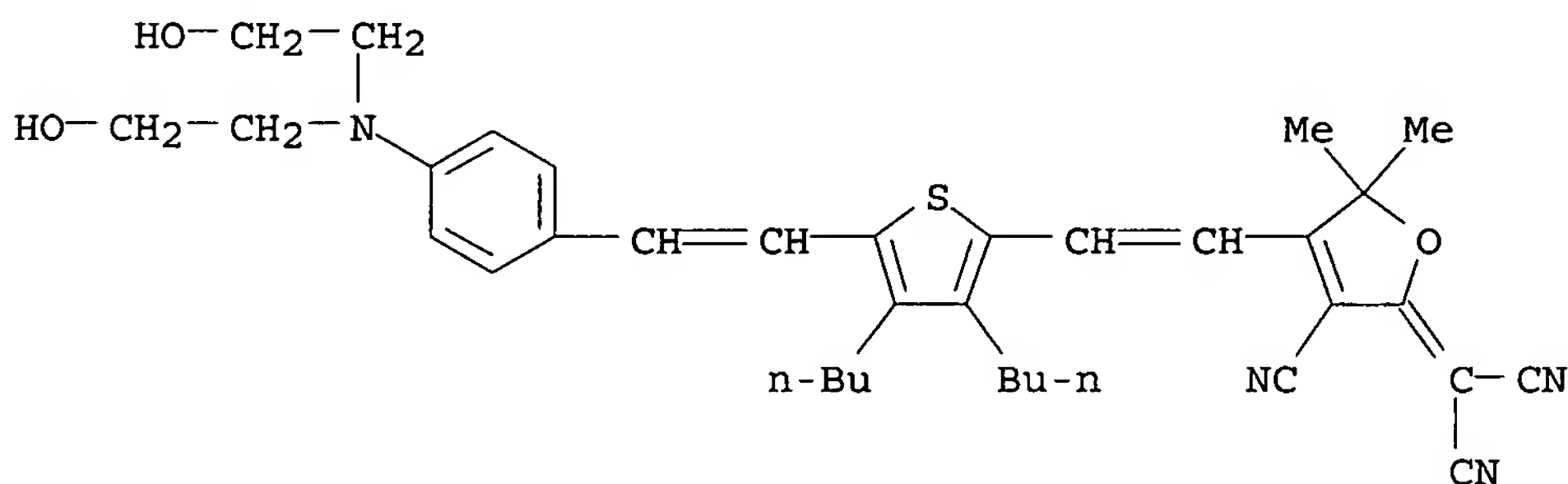
PAGE 1-A

PAGE 2-A



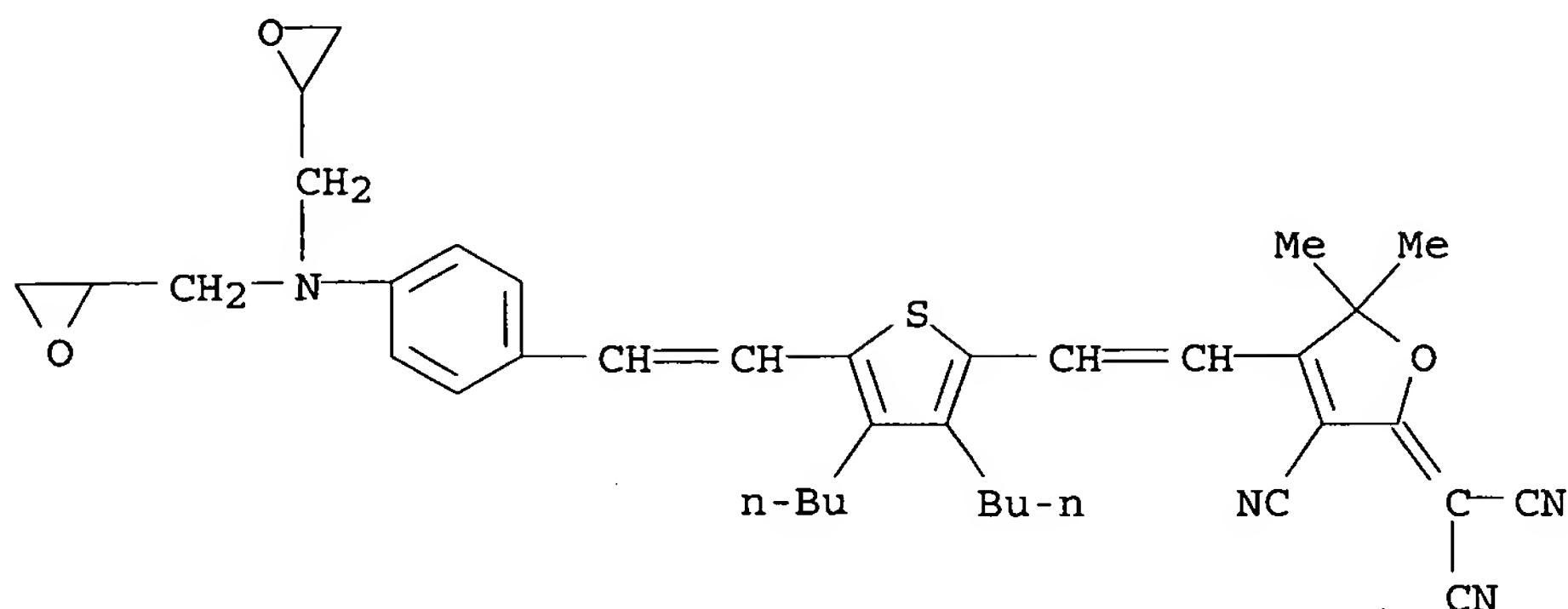
REFERENCE COUNT: 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 112 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 1999:211127 HCAPLUS  
 DOCUMENT NUMBER: 130:353208  
 TITLE: Epoxy thermosetting NLO material  
 AUTHOR(S): Chen, Mingfei; Ren, Albert S.; Wang, Judy F.; Lee, Michael S.; Dalton, Larry R.; Zhang, Hua; Sun, Guilin; Steier, William H.  
 CORPORATE SOURCE: Loker Hydrocarbon Institute, University of Southern California, Los Angeles, CA, 90089, USA  
 SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (1999), 40(1), 162  
 CODEN: ACPPAY; ISSN: 0032-3934  
 PUBLISHER: American Chemical Society, Division of Polymer Chemistry  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB A High  $\mu$ -beta chromophore with epoxide functional groups was concisely synthesized by a Heck reaction. The chromophore was successfully incorporated into an epoxy thermosetting material. A 30° C increase in electro-optic thermal stability was observed as compared to the polyurethane analog of the same chromophore.  
 IT 224746-62-7P 224746-64-9P  
 RL: MOA (Modifier or additive use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)  
 (chromophore; preparation and characterization of epoxy thermosetting nonlinear optical materials)  
 RN 224746-62-7 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



RN 224746-64-9 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis(oxiranylmethyl)amino]phenyl]ethenyl]-

3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



REFERENCE COUNT: 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 113 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 1999:211070 HCAPLUS

DOCUMENT NUMBER: 130:352987

TITLE: Investigation on new polyurethanes and incorporation of a soluble high  $\mu\beta$  chromophore for electro-optic applications

AUTHOR(S): Zhang, Cheng; Wang, Chuanguang; Dalton, Larry R.; Sun, Guilin; Zhang, Hua; Steier, William H.

CORPORATE SOURCE: Loker Hydrocarbon Institute and Department of Chemistry, University of Southern California, Los Angeles, CA, 90089-1062, USA

SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (1999), 40(1), 51-52

CODEN: ACPPAY; ISSN: 0032-3934

PUBLISHER: American Chemical Society, Division of Polymer Chemistry

DOCUMENT TYPE: Journal

LANGUAGE: English

AB A state-of-art chromophore CLD-2 was derivatized with a hexyl group to improve the processibility. The new chromophore, CLD-5, was first studied in the traditional TDI/TEA polyurethane and gave 55 pm/V @ 1.06 mm. Two new polyurethane systems, poly[(Ph isocyanate)-co-formaldehyde] (PPIF) / triethanolamine (TEA) and PPIF/bisphenyl-1,1'-dimethyl (BPDM) were designed to incorporate CLD-5. Higher electro-optical coeffs. (up to 41 pm/V at 1.06 mm), higher temporal stabilities (up to 133 C, 43 C higher than TDI/TEA), and lower optical losses (around 2.56 dB/cm @ 1.3 mm) were all achieved in the less densely crosslinked but more rigid PPIF/BPDM system.

IT 224768-40-5P 224768-41-6P

RL: MOA (Modifier or additive use); SPN (Synthetic preparation); PREP (Preparation); USES (Uses)

(chromophore; preparation and characterization of soluble chromophore for electrooptic applications using polyurethanes)

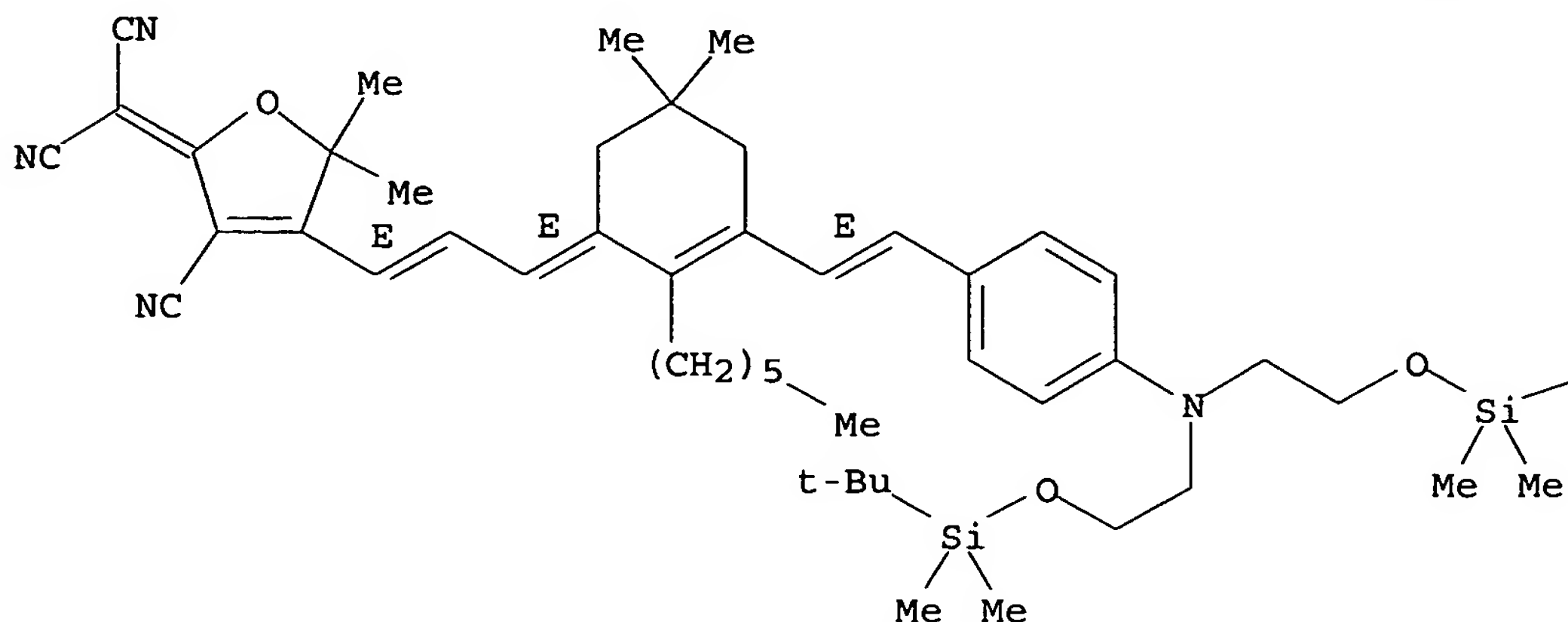
RN 224768-40-5 HCAPLUS

CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-

furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.

PAGE 1-A

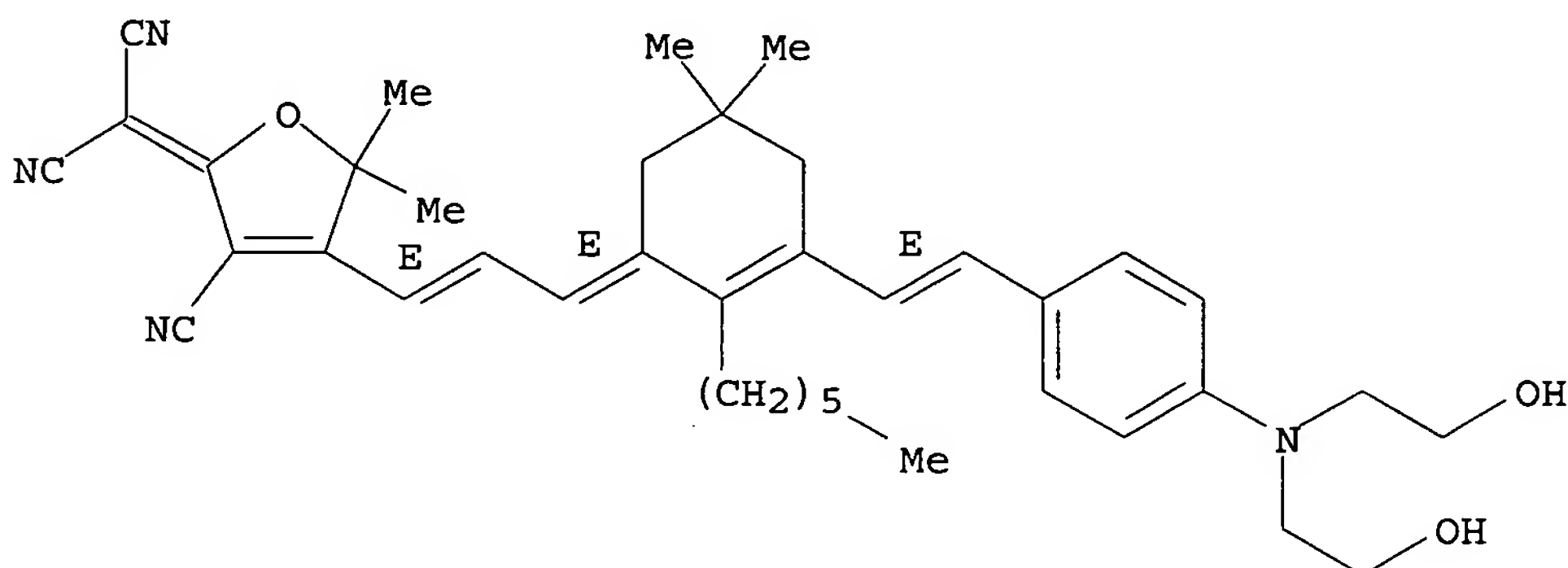


PAGE 1-B

—Bu-t

RN 224768-41-6 HCAPLUS  
 CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)

Double bond geometry as shown.



IT 224768-46-1 224768-47-2

RL: DEV (Device component use); PRP (Properties); USES (Uses)  
(preparation and characterization of soluble chromophore for electrooptic applications using polyurethanes)

RN 224768-46-1 HCAPLUS

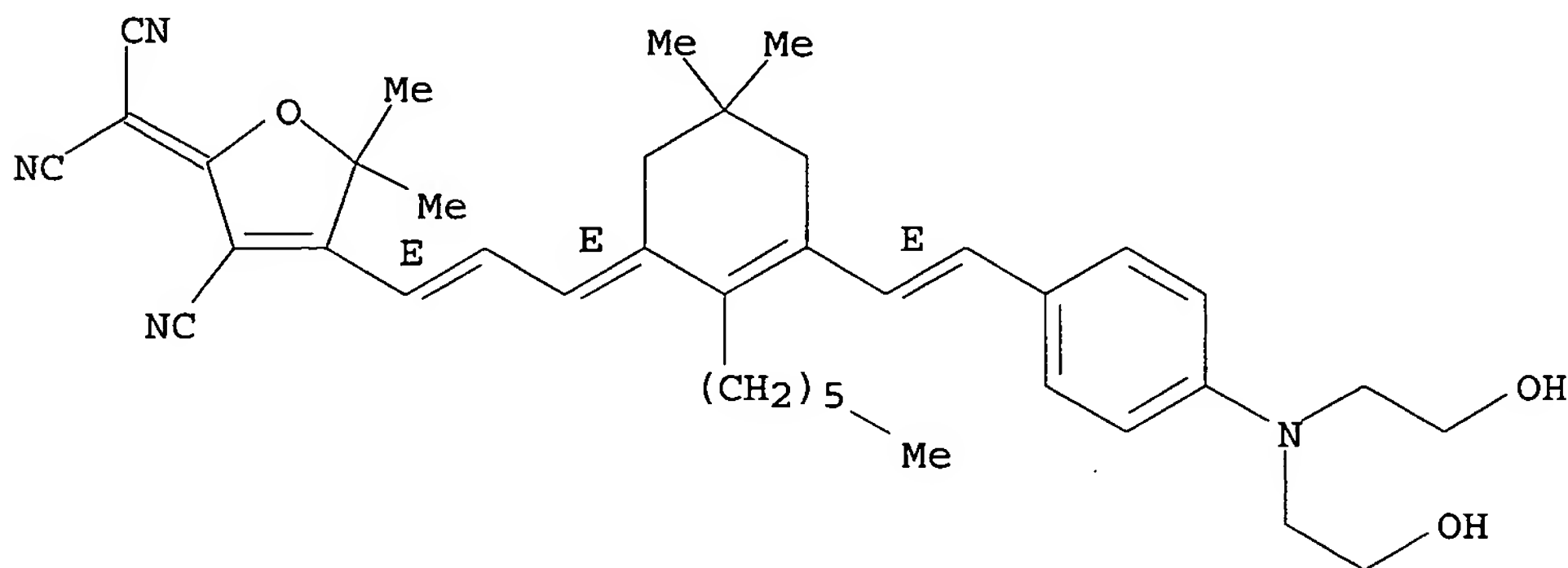
CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-, polymer with formaldehyde, isocyanatobenzene and 2,2',2''-nitrilotris[ethanol] (9CI) (CA INDEX NAME)

CM 1

CRN 224768-41-6

CMF C39 H48 N4 O3

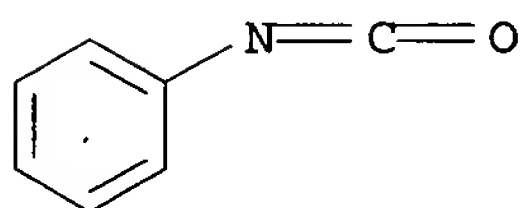
Double bond geometry as shown.



CM 2

CRN 103-71-9

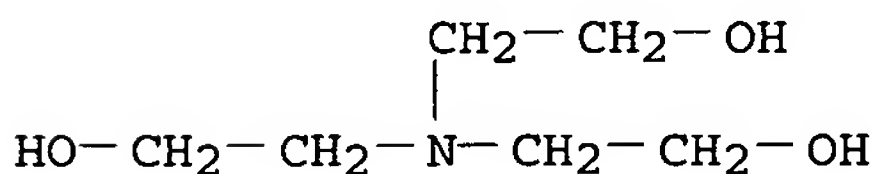
CMF C7 H5 N O



CM 3

CRN 102-71-6

CMF C6 H15 N O3





CM 4

CRN 50-00-0  
CMF C H2 O



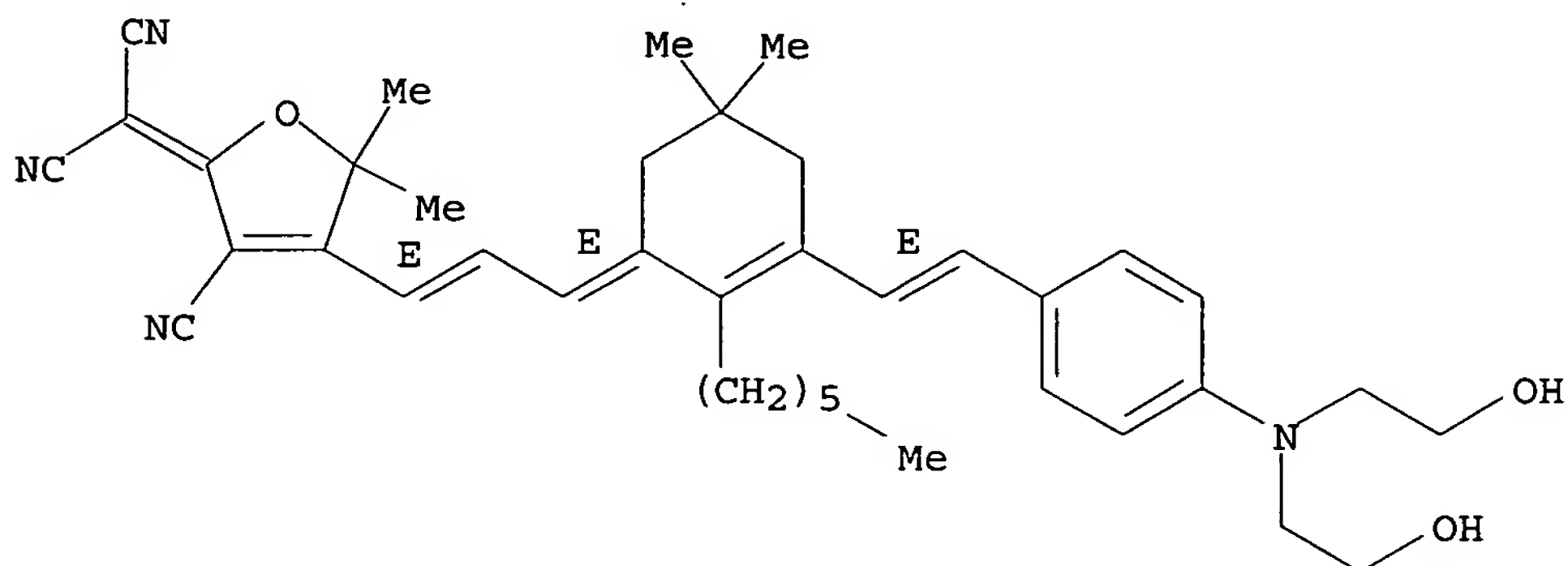
RN 224768-47-2 HCAPLUS

CN Propanedinitrile, [4-[(1E,3E)-3-[3-[(1E)-2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-2-hexyl-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]-, polymer with [1,1'-biphenyl]-2,2'-dimethanol, formaldehyde and isocyanatobenzene (9CI) (CA INDEX NAME)

CM 1

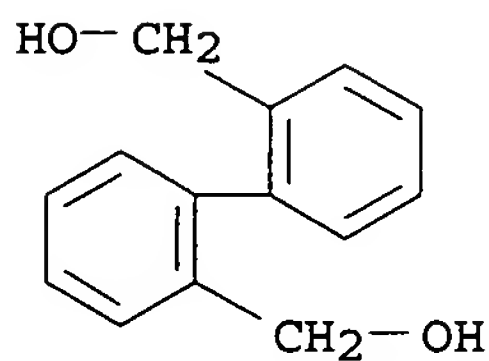
CRN 224768-41-6  
CMF C39 H48 N4 O3

Double bond geometry as shown.



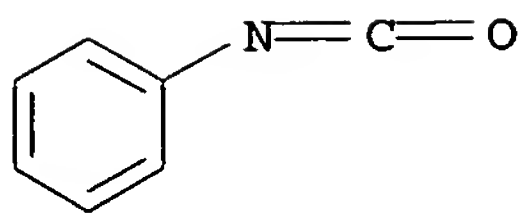
CM 2

CRN 3594-90-9  
CMF C14 H14 O2



CM 3

CRN 103-71-9  
CMF C7 H5 N O



CM 4

CRN 50-00-0

CMF C H2 O

H<sub>2</sub>C=O

REFERENCE COUNT: 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 114 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 1999:211069 HCAPLUS

DOCUMENT NUMBER: 130:352710

TITLE: Thermally stable polyene-based NLO chromophore and its polymers with very high electro-optical coefficients  
 AUTHOR(S): Zhang, Cheng; Ren, Albert S.; Wang, Fang; Dalton, Larry R.; Lee, Sang-Shin; Garner, Sean M.; Steier, William H.

CORPORATE SOURCE: Loker Hydrocarbon Institute and Department of Chemistry, University of Southern California, CA, USA

SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (1999), 40(1), 49-50  
 CODEN: ACPPAY; ISSN: 0032-3934

PUBLISHER: American Chemical Society, Division of Polymer Chemistry

DOCUMENT TYPE: Journal

LANGUAGE: English

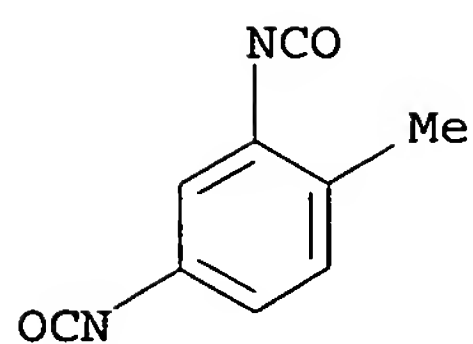
AB A novel methodol. to synthesize ring-locked aminophenyltetraene donor-bridge was developed which allows essentially all acceptors bearing acidic Me or methylene group to be coupled. Chromophores based on the donor-bridge and 2-dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran acceptor were synthesized and studied in composite (PMMA host) and covalently attached polymer systems. Chromophore CLD-1 and its deprotected version CLD-2 have excellent thermal stability; the CLD-2 chromophore has free hydroxy groups which were used to introduce it to a polyurethane network. The chromophores show exceptionally high nonlinearity and the r<sub>33</sub> achieved, 74 pm/V and 45 pm/V resp., is a new level of electro-optical coefficient of polymeric materials.

IT 224784-30-9P 224784-31-0P 266348-41-8P  
 RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
 (preparation of thermally stable polyene-based NLO chromophores and polymers with very high electro-optical coefficient)

RN 224784-30-9 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis(2-hydroxyethyl)amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlydene]- (9CI) (CA INDEX NAME)

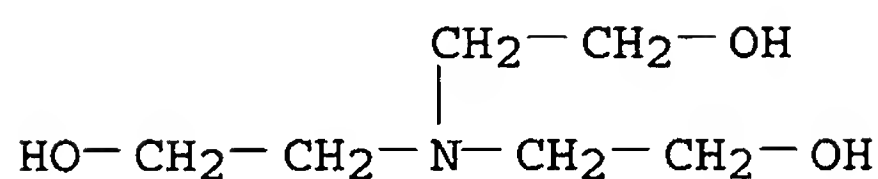




CM 3

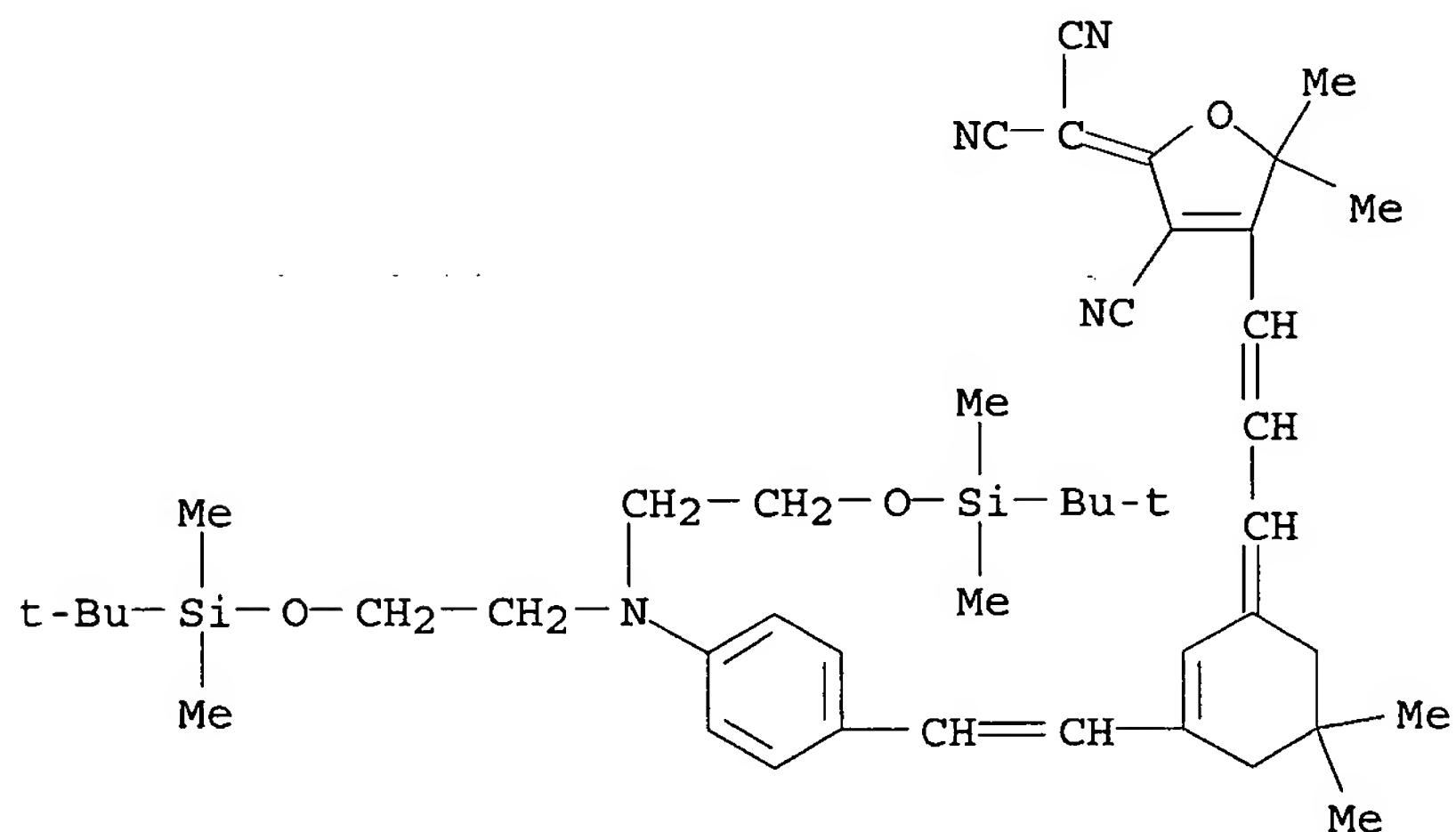
CRN 102-71-6

CMF C6 H15 N O3



RN 266348-41-8 HCAPLUS

CN Propanedinitrile, [4-[3-[3-[2-[4-[bis[2-[[[(1,1-dimethylethyl)dimethylsilyl]oxy]ethyl]amino]phenyl]ethenyl]-5,5-dimethyl-2-cyclohexen-1-ylidene]-1-propenyl]-3-cyano-5,5-dimethyl-2(5H)-furanylidene]-(9CI) (CA INDEX NAME)



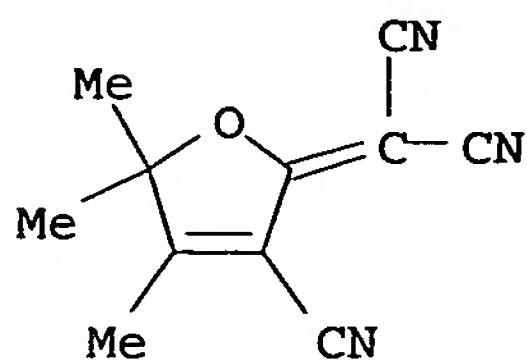
IT 171082-32-9, 2-Dicyanomethylene-3-cyano-4,5,5-trimethyl-2,5-dihydrofuran

RL: RCT (Reactant); RACT (Reactant or reagent)

(preparation of thermally stable polyene-based NLO chromophores and polymers with very high electro-optical coefficient)

RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene) - (9CI) (CA INDEX NAME)



REFERENCE COUNT: 12 THERE ARE 12 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 115 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 1999:107637 HCAPLUS

DOCUMENT NUMBER: 130:259118

TITLE: Femtosecond, Frequency-Agile, Phase-Sensitive-Detected, Multi-Wave-Mixing Nonlinear Optical Spectroscopy Applied to  $\pi$ -Electron Photonic Materials

AUTHOR(S): Drenser, K. A.; Larsen, R. J.; Strohkendl, F. P.; Dalton, L. R.

CORPORATE SOURCE: Loker Hydrocarbon Research Institute, University of Southern California, CA, 90089-1662, USA

SOURCE: Journal of Physical Chemistry A (1999), 103(14), 2290-2301

CODEN: JPCAFH; ISSN: 1089-5639

PUBLISHER: American Chemical Society

DOCUMENT TYPE: Journal

LANGUAGE: English

AB Degenerate four-wave mixing (DFWM) spectroscopy is modified to exploit femtosecond pulses, phase-sensitive-detection, frequency (wavelength) agility, two-color (nearly degenerate multi-wave mixing) radiation, and improved signal-to-noise capabilities that can be realized through a combination of new solid state lasers, nonlinear optical components, and novel design concepts. The resulting time-resolved nonlinear optical techniques permit instantaneous optical nonlinearities, such as two-photon absorption cross sections, to be accurately measured over the spectral range from 450 to 2500 nm (and with significantly greater effort from 225 to 5000 nm). The power of the new techniques is illustrated by their application to the definition of Hg two-photon resonances of C60 and C70 as well as to the characterization of optical nonlinearities in two linear chromophores of putative utility for sensor protection and electrooptic modulation. Explicitly, these measurements provide accurate determination of both

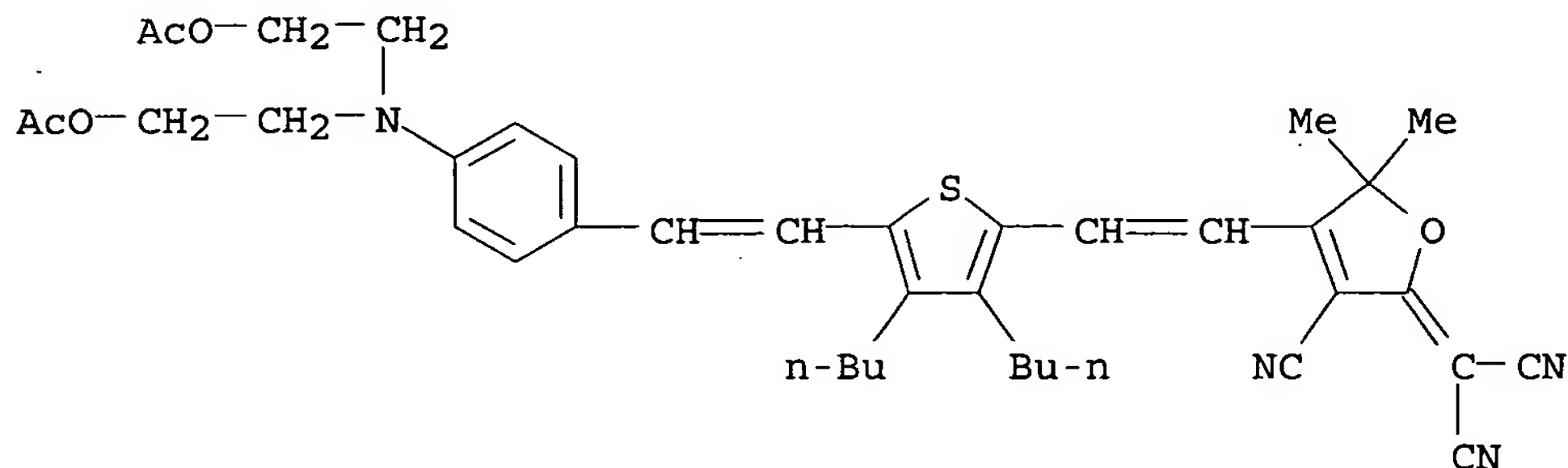
transition energies and transition moments (matrix elements connecting the two photon levels). Results are compared to those previously reported in the literature illustrating the advantages and problems associated with particular measurement techniques. All of the mols. studied exhibit two-photon absorption coeffs. comparable to that of GaAs, the most studied putative sensor protection material (based on use of electronic optical nonlinearity). Femtosecond pulse techniques are shown, in all cases, to be necessary to avoid complications arising from excited-state absorption and relaxation phenomena. The importance of phase-sensitive detection in identifying complications from overlapping transitions is illustrated.

IT 213131-98-7

RL: PRP (Properties)

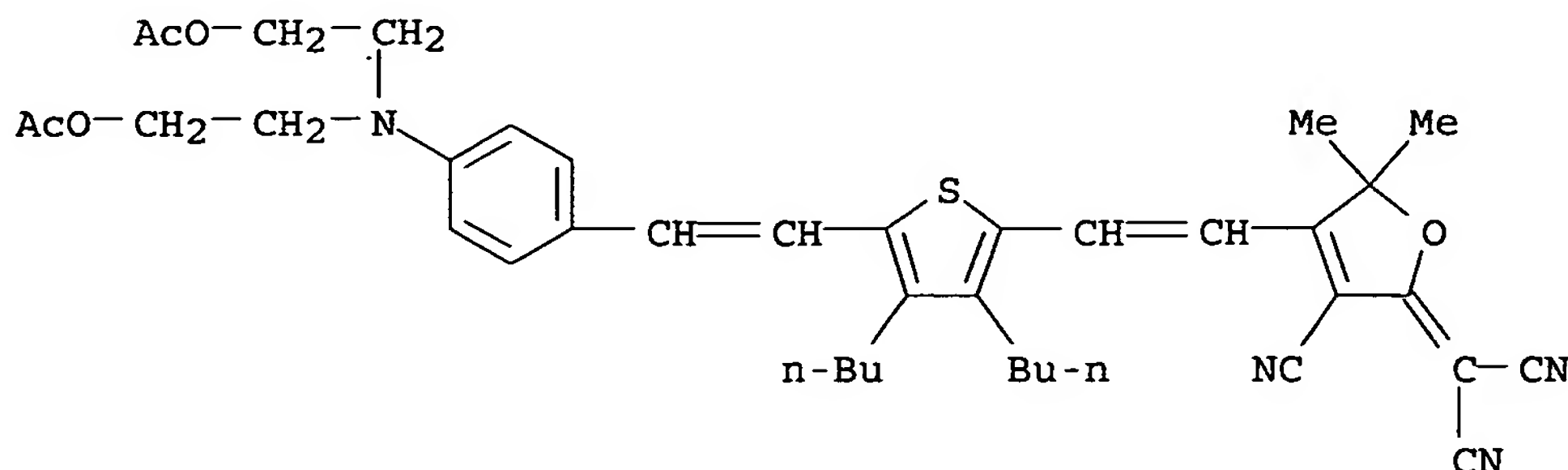
(femtosecond, frequency-agile, phase-sensitive-detected, multi-wave-mixing nonlinear optical spectroscopy applied to  $\pi$ -electron photonic materials)

RN 213131-98-7 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)



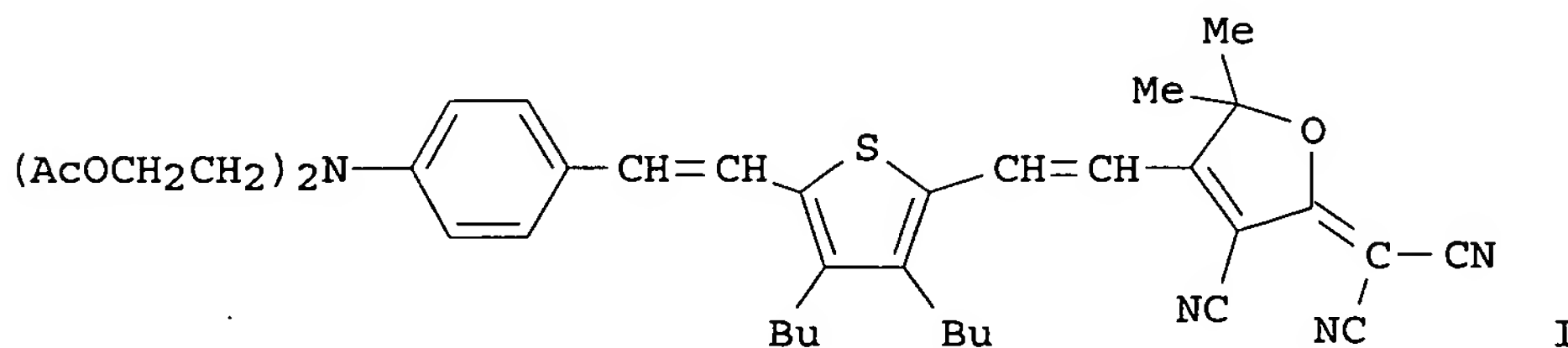
REFERENCE COUNT: 114 THERE ARE 114 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE REFORMAT

L8 ANSWER 116 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 1998:550105 HCAPLUS  
 DOCUMENT NUMBER: 129:246191  
 TITLE: High electro-optic coefficient from a polymer containing high  $\mu\beta$  chromophores  
 AUTHOR(S): Wang, Fang; Ren, Albert S.; He, Mingqian; Harper, Aaron W.; Dalton, Larry R.; Garner, Sean M.; Zhang, Hua; Chen, Antao; Steier, William H.  
 CORPORATE SOURCE: Department of Chemistry, Loker Hydrocarbon Research Institute, University of Southern California, Los Angeles, CA, 90089-1661, USA  
 SOURCE: Polymeric Materials Science and Engineering (1998), 78, 42-43  
 CODEN: PMSEDG; ISSN: 0743-0515  
 PUBLISHER: American Chemical Society  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 AB The electrooptical coefficient (r33) values of PMMA doped (16.6%) with a new furan ring-based NLO chromophore (FTC-2AcO) are reported. FTC-2AcO has excellent solubility, high thermal stability, a relatively low chromophore absorption maximum, and a very high r33.  
 IT 213131-98-7  
 RL: MOA (Modifier or additive use); PRP (Properties); USES (Uses) (electrooptical coefficient of NLO chromophore in PMMA)  
 RN 213131-98-7 HCAPLUS  
 CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furanlylidene]- (9CI) (CA INDEX NAME)



REFERENCE COUNT: 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 117 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN  
 ACCESSION NUMBER: 1998:532284 HCAPLUS  
 DOCUMENT NUMBER: 129:276799  
 TITLE: Design, synthesis and characterization of a novel substituted dicyanomethylendihydrofuran based high- $\beta$  NLO chromophore and its polymers with exceptionally high electro-optic coefficients  
 AUTHOR(S): Wang, Fang; Ren, Albert A.; He, Mingqian; Lee, Michael S.; Harper, Aaron W.; Dalton, Larry R.; Zhang, Hua; Garner, Sean M.; Chen, Antao; Steier, William H.  
 CORPORATE SOURCE: Loker Hydrocarbon Inst. and Dep. Chem., Univ. Southern California, Los Angeles, CA, 90089-1661, USA  
 SOURCE: Polymer Preprints (American Chemical Society, Division of Polymer Chemistry) (1998), 39(2), 1065-1066  
 CODEN: ACPPAY; ISSN: 0032-3934  
 PUBLISHER: American Chemical Society, Division of Polymer Chemistry  
 DOCUMENT TYPE: Journal  
 LANGUAGE: English  
 GI



AB A second order nonlinear optical chromophore having the structure I and exhibiting high mol. nonlinearity, high thermal stability, and low optical absorption was prepared and characterized. Excellent optical quality films were obtained when I was co-dissolved in 1,2-dichloroethane with poly(Methacrylate) (PMMA) and spin-cast onto ITO-coated glass substrates. An electrooptic coefficient of 56.9 pm/V at 1.06  $\mu$ m was achieved with a loading d. of 16.6 weight %. The film absorption maximizes at 630 nm and the propagation optical loss was found to be 0.75 dB/cm using the "immersion technique". An observed attenuation of the electrooptic coefficient was predicted by the extended London theory when the mol. shape was taken into account. Covalent attachment of I to a crosslinked polyurethane network resulted in



a maximum electrooptic coefficient of 42 pm/V at 1.06  $\mu$ m with a loading of 15 weight %. The decrease of the electrooptic coefficient of the polyurethanes compared to those of the PMMA composites was significant and attributed to the lower poling efficiency of the covalently attached system where the chromophores have less freedom than in the case of doped systems. Bias poled modulators and high-speed electrooptic modulators were fabricated using the materials.

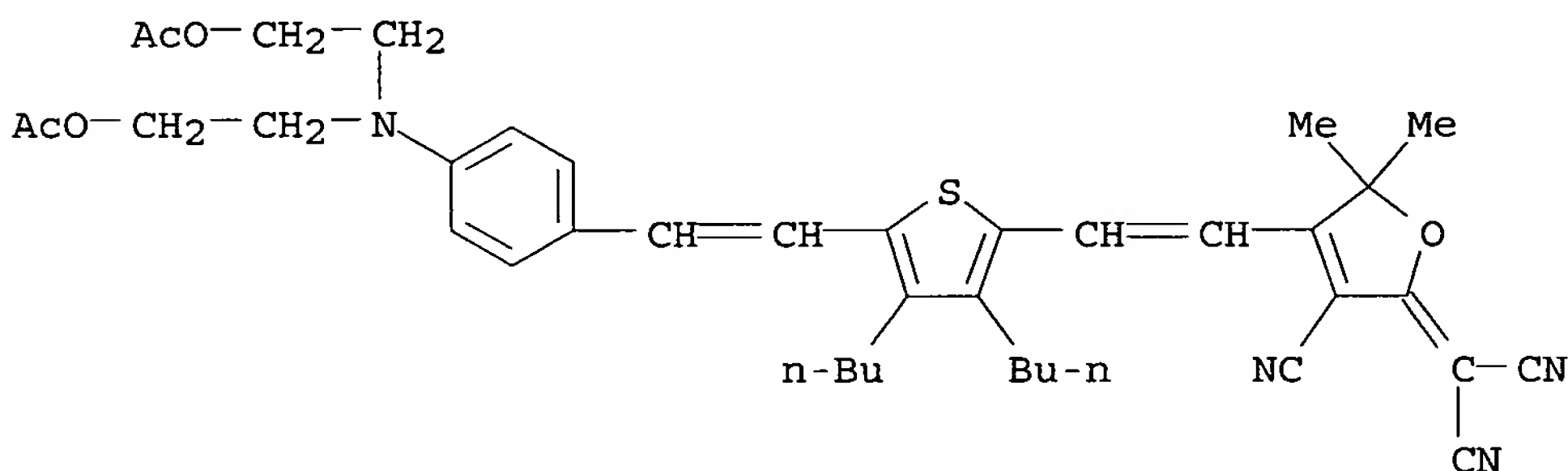
IT 213131-98-7D, reaction products with polyurethanes

RL: PRP (Properties)

(design, synthesis and characterization of substituted dicyanomethylendihydrofuran-based high- $\beta$  nonlinear optical chromophore and chromophore doped and modified polymers with exceptionally high electrooptic coeffs.)

RN 213131-98-7 HCAPLUS

CN Propanedinitrile, [4-[2-[5-[2-[4-[bis[2-(acetyloxy)ethyl]amino]phenyl]ethenyl]-3,4-dibutyl-2-thienyl]ethenyl]-3-cyano-5,5-dimethyl-2(5H)-furan-2-ylidene]- (9CI) (CA INDEX NAME)



RL: PRP (Properties); SPN (Synthetic preparation); PREP (Preparation)  
(design, synthesis and characterization of substituted dicyanomethylendihydrofuran-based high- $\beta$  nonlinear optical chromophore and chromophore doped and modified polymers with exceptionally high electrooptic coeffs.)

REFERENCE COUNT: 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD. ALL CITATIONS AVAILABLE IN THE RE FORMAT

L8 ANSWER 118 OF 118 HCAPLUS COPYRIGHT 2005 ACS on STN

ACCESSION NUMBER: 1995:752764 HCAPLUS

DOCUMENT NUMBER: 124:8531

TITLE: Synthesis of substituted dicyanomethylendihydrofurans

AUTHOR(S): Melikian, Gaguik; Rouessac, Francis P.; Alexandre, Christian

CORPORATE SOURCE: Laboratoire de Synthèse Organique, Faculté des Sciences, Le Mans, 72017, Fr.

SOURCE: Synthetic Communications (1995), 25(19), 3045-51  
CODEN: SYNCAV; ISSN: 0039-7911

PUBLISHER: Dekker

DOCUMENT TYPE: Journal

LANGUAGE: English

OTHER SOURCE(S): CASREACT 124:8531

AB A simple and efficient method for the preparation of the title compds. is described from  $\alpha$ -ketols and malononitrile in the presence of sodium ethylate at room temperature. These compds. lead to unsatd. derivs. by condensation with aldehydes. For example, condensation reaction of propanedinitrile and 3-hydroxy-3-methyl-2-butanone gave (3-cyano-2,5-dihydro-4,5,5-trimethyl-2-furanylidene)propanedinitrile.

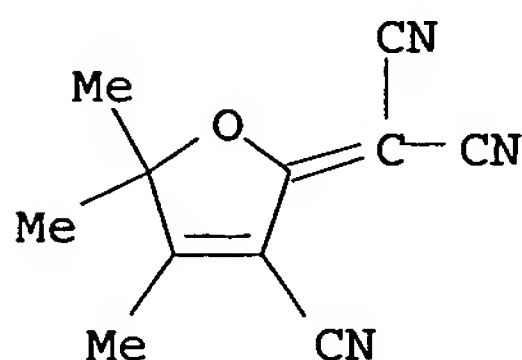


IT 171082-32-9P 171082-33-0P 171082-34-1P

RL: RCT (Reactant); SPN (Synthetic preparation); PREP (Preparation); RACT  
(Reactant or reagent)  
(preparation of dicyanomethylendihydrofurans from hydroxy ketones and  
propanedinitrile)

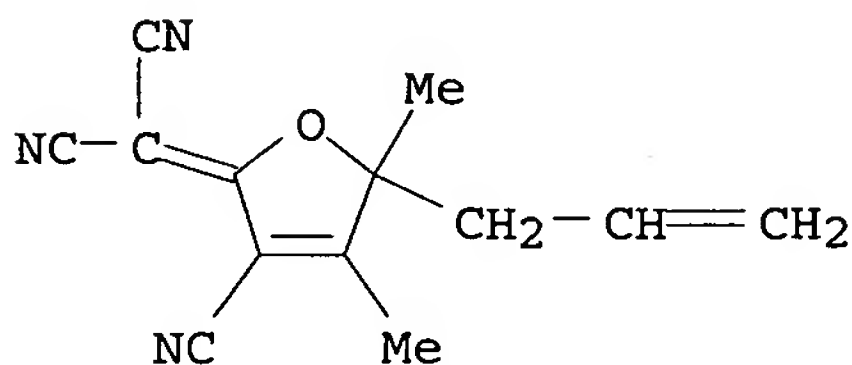
RN 171082-32-9 HCAPLUS

CN Propanedinitrile, (3-cyano-4,5,5-trimethyl-2(5H)-furanylidene)- (9CI) (CA  
INDEX NAME)



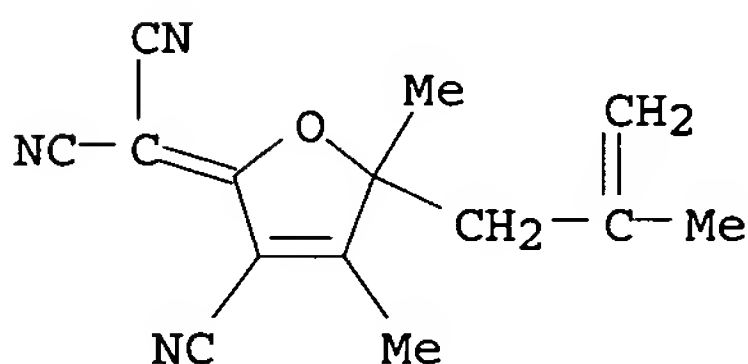
RN 171082-33-0 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(2-propenyl)-2(5H)-furanylidene]-  
(9CI) (CA INDEX NAME)



RN 171082-34-1 HCAPLUS

CN Propanedinitrile, [3-cyano-4,5-dimethyl-5-(2-methyl-2-propenyl)-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



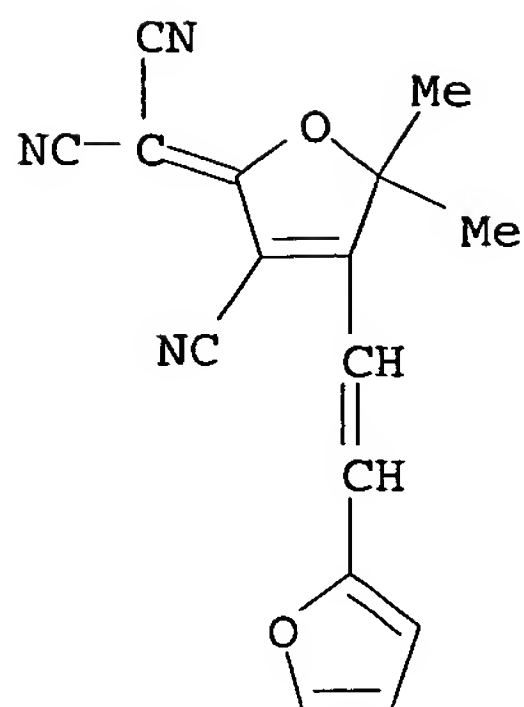
IT 171082-36-3P 171082-37-4P 171082-38-5P

171082-39-6P

RL: SPN (Synthetic preparation); PREP (Preparation)  
(preparation of dicyanomethylendihydrofurans from hydroxy ketones and  
propanedinitrile)

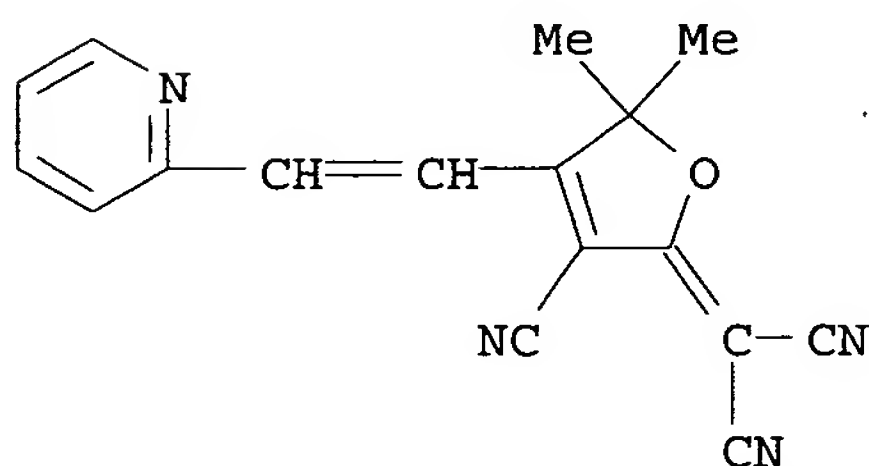
RN 171082-36-3 HCAPLUS

CN Propanedinitrile, [3-cyano-4-[2-(2-furanyl)ethenyl]-5,5-dimethyl-2(5H)-  
furanylidene]- (9CI) (CA INDEX NAME)



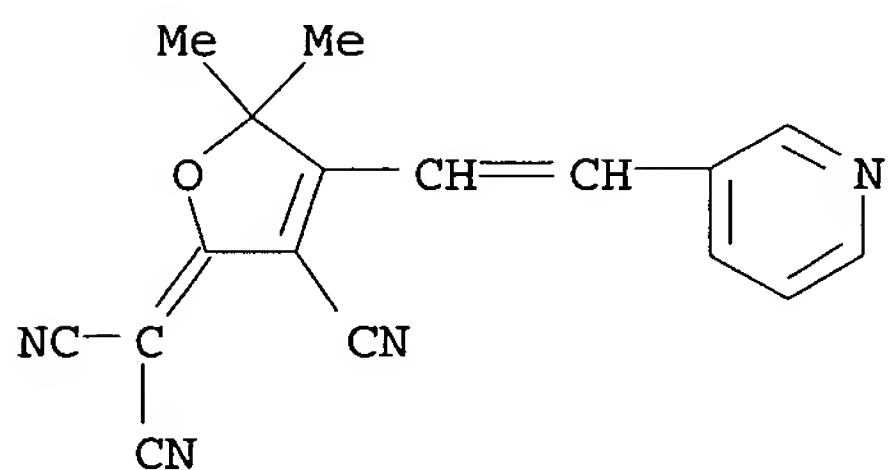
RN 171082-37-4 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[2-(2-pyridinyl)ethenyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



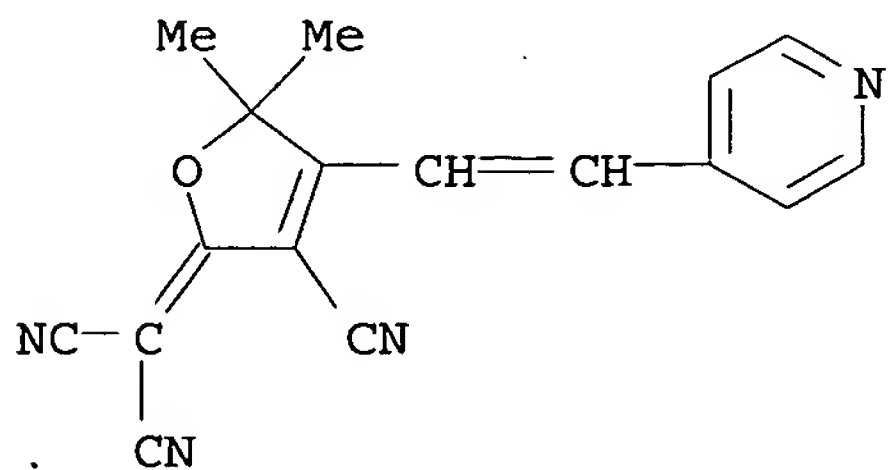
RN 171082-38-5 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[2-(3-pyridinyl)ethenyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)



RN 171082-39-6 HCAPLUS

CN Propanedinitrile, [3-cyano-5,5-dimethyl-4-[2-(4-pyridinyl)ethenyl]-2(5H)-furanylidene]- (9CI) (CA INDEX NAME)





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